

1998-2004 AUTOMATIC TRANSMISSIONS

Overhaul - New Beetle, 01M

APPLICATION

TRANSMISSION APPLICATION

Application	Transaxle Model
New Beetle	01M, 4-Speed

IDENTIFICATION

Transmission type and code letters are cast into transmission case. See **Fig. 1** . The code letters of the transmission are also given on the vehicle data plates. For further identification, see CODE LETTERS, TRANSMISSION APPLICATION, RATIOS, EQUIPMENT .

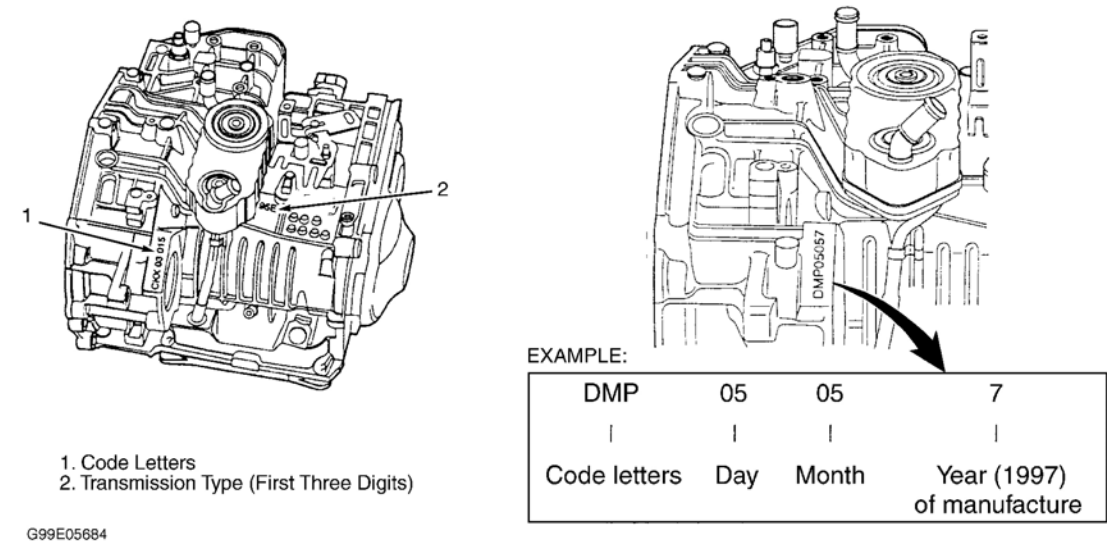


Fig. 1: Identification Of Transmission Type & Code Letters
Courtesy of VOLKSWAGEN UNITED STATES, INC.

GEAR RATIOS

For gear ratios, see CODE LETTERS, TRANSMISSION APPLICATION, RATIOS, EQUIPMENT .

CODE LETTERS, TRANSMISSION APPLICATION, RATIOS, EQUIPMENT

Automatic transmission		01M					
Transmission	Codes	DYQ		ECN		ECP	
	Manufactured from to	11.97 08.98		08.98 05.99		08.98 05.99	
Torque converter Codes		QBDC		QCDC		QCDC	
For turbine shaft with sleeve bearing see TORQUE CONVERTER IDENTIFICATION		QBDD		QCDD		QBDD	
Torque converter Codes		QBDD		QCDD		QBDD	
Valve body	Codes	QFB		QFB		QFB	
	Manufactured from to	01.97		01.97		01.97	
Number of plates		Inner	Outer	Inner	Outer	Inner	Outer
Clutch -K1-		5	5	5	5	5	5
Clutch -K2-		4	4	5	5	5	5
Clutch -K3-		5	4	6	5	6	5
Brake -B1-		5	5	5	5	6	6
Brake -B2-		4	5	5	6	5	6
Application	Model	New Beetle 1998		New Beetle 1998		New Beetle 1998	
	Engine	2.0 ltr. - 85 kW		1.9 ltr. - 66 kW TDI		1.8 ltr. - 110 kW	

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Fig. 2: Transmission Codes DYQ, ECN & ECP (1 Of 2)
Courtesy of VOLKSWAGEN UNITED STATES, INC.

Transmission	Codes		DYQ	ECN	ECP
Ratios	1st gear		2.714	2.714	2.714
	2nd gear		1.551	1.441	1.441
	3rd gear		1.000	1.000	1.000
	4th gear		0.679	0.742	0.742
	Reverse gear		2.111	2.884	2.884
Intermediate drive	No. of teeth	Input gear	61	45	45
		Output gear	63	44	44
	Ratio		1.033	0.978	0.978
Final drive	No. of teeth	Drive pinion	16	20	15
		Ring gear	78	74	68
	Ratio		4.875	3.700	4.533
Drive shaft	Flange dia. mm		Triple roller	Triple roller	Triple roller
ATF cooler	Equipment		Pressure-side 6-row	Pressure-side 6-row	Pressure-side 6-row

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Fig. 3: Transmission Codes DYQ, ECN & ECP (2 Of 2)
Courtesy of VOLKSWAGEN UNITED STATES, INC.

Automatic transmission		01M					
Gearbox	Code letters	EFB		ECV		FDB	
	Manufactured from to	10.98 05.99		08.98 05.99		03.00	
Torque converter Codes		QBDC		QBDC		-	
For turbine shaft with sleeve bearing see TORQUE CONVERTER IDENTIFICATION		QBDC		QBDC		-	
For turbine shaft without sleeve bearing see TORQUE CONVERTER IDENTIFICATION		QBDD		QADD		QCDD	
Valve body	Codes	QFB		QFB		QFB	
	Manufactured from to	01.97		01.97		03.00	
Number of plates		Inner	Outer	Inner	Outer	Inner	Outer
	Clutch -K1-	5	5	5	5	5	5
	Clutch -K2-	4	4	4	4	5	5
	Clutch -K3-	5	4	5	4	6	5
	Brake -B1-	5	5	5	5	5	5
	Brake -B2-	4	5	4	5	5	6
Application	Model	New Beetle 1998		New Beetle 1998		New Beetle 1998	
	Engine	2.0 ltr. - 85		2.0 ltr. - 85		1.9 ltr. - 66 kW	

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Fig. 4: Transmission Codes EFB, ECV & FDB (1 Of 2)
Courtesy of VOLKSWAGEN UNITED STATES, INC.

Transmission	Code letters		EFB	ECV	FDB
Ratios	1st gear		2.714	2.714	2.714
	2nd gear		1.441	1.551	1.441
	3rd gear		1.000	1.000	1.000
	4th gear		0.742	0.679	0.742
	Reverse gear		2.884	2.111	2.884
Intermediate drive	No. of teeth	Input gear	45	61	45
		Output gear	44	63	44
	Ratio		0.978	1.033	0.978
Final drive	No. of teeth	Drive pinion	15	16	20
		Ring gear	68	78	74
	Ratio		4.533	4.875	3.700
Drive shaft	Flange dia. mm		Triple roller	Triple roller	Triple roller
ATF cooler	Equipment		Pressure-side 6-row	Pressure-side 6-row	Pressure-side 6-row

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Fig. 5: Transmission Codes EFB, ECV & FDB (2 Of 2)
Courtesy of VOLKSWAGEN UNITED STATES, INC.

Automatic transmission			01M					
Transmission	Code letters		ELU		ELT		ELY	
	Manufactured	from to	05.99 12.99		05.99 12.99		05.99 12.99	
Torque converter	Code letters		QCDC		QCDC		QBDC	
For turbine shaft with sleeve see TORQUE CONVERTER IDENTIFICATION								
For turbine shaft without sleeve bearing see TORQUE CONVERTER IDENTIFICATION			QCDD		QCDD		QBDD	
Valve body	Code letters		QFB		QFB		QFB	
	Manufactured	from to	03.00		03.00		03.00	
Number of plates			Inner	Outer	Inner	Outer	Inner	Outer
Clutch -K1-			5	5	5	5	5	5
Clutch -K2-			5	5	5	5	4	4
Clutch -K3-			6	5	6	5	5	4
Brake -B1-			6	6	5	5	5	5
Brake -B2-			5	6	5	6	4	5
Application	Model		New Beetle 1998		New Beetle 1998		New Beetle 1998	
	Engine		1.8 ltr. - 110 kW		1.9 ltr. - 66 kW TDI		2.0 ltr. - 85 kW	

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Fig. 6: Transmission Codes ELU, ELT & ELY (1 Of 2)
Courtesy of VOLKSWAGEN UNITED STATES, INC.

Transmission	Code letters		ELU	ELT	ELY
Ratios	1st gear		2.714	2.714	2.714
	2nd gear		1.441	1.441	1.551
	3rd gear		1.000	1.000	1.000
	4th gear		0.742	0.742	0.679
	Reverse gear		2.884	2.884	2.111
Intermediate drive	No. of teeth	Input gear	45	45	61
		Output gear	44	44	63
	Ratio		0.978	0.978	1.033
Final drive	No. of teeth	Drive pinion	15	20	16
		Ring gear	68	74	78
	Ratio		4.533	3.700	4.875
Drive shaft	Flange dia. mm		Triple roller	Triple roller	Triple roller
ATF cooler	Equipment		Pressure-side 6-row	Pressure-side 6-row	Pressure-side 6-row

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Fig. 7: Transmission Codes ELU, ELT & ELY (2 Of 2)
Courtesy of VOLKSWAGEN UNITED STATES, INC.

Automatic transmission		01M					
Transmission	Codes	ELZ		EPB		EPC	
	Manufactured from to	05.99 12.99		12.99 03.00		12.99 02.00	
Torque converter	Codes	QBDC		QCDD		QCDD	
Valve body	Code letters	QFB		QFB		QFB	
	Manufactured from to	03.00		03.00		03.00	
Number of plates		Inner	Outer	Inner	Outer	Inner	Outer
	Clutch -K1-	5	5	5	5	5	5
	Clutch -K2-	4	4	5	5	5	5
	Clutch -K3-	5	4	6	5	6	5
	Brake -B1-	5	5	5	5	6	6
	Brake -B2-	4	5	5	6	5	6
Application	Model	New Beetle 1998		New Beetle 1998		New Beetle 1998	
	Engine	2.0 ltr. - 85 kW		1.9 ltr. - 66 kW TDI		1.8 ltr. - 110 kW	

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Fig. 8: Transmission Codes ELZ, EPB & EPC (1 Of 2)
Courtesy of VOLKSWAGEN UNITED STATES, INC.

Transmission	Codes		ELZ	EPB	EPC
Ratios	1st gear		2.714	2.714	2.714
	2nd gear		1.441	1.441	1.441
	3rd gear		1.000	1.000	1.000
	4th gear		0.742	0.742	0.742
	Reverse gear		2.884	2.884	2.884
Intermediate drive	No. of teeth	Input gear	45	45	45
		Output gear	44	44	44
	Ratio		0.978	0.978	0.978
Final drive	No. of teeth	Drive pinion	15	20	15
		Ring gear	68	74	68
	Ratio		4.533	3.700	4.533
Drive shaft	Flange dia. mm		Triple roller	Triple roller	Triple roller
ATF cooler	Equipment		Pressure-side 6-row	Pressure-side 6-row	Pressure-side 6-row

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Fig. 9: Transmission Codes ELZ, EPB & EPC (2 Of 2)
Courtesy of VOLKSWAGEN UNITED STATES, INC.

Automatic transmission		01M					
Transmission	Codes	FDC		FDF		FDG	
	Manufactured from to	02.00		02.00		02.00	
Torque converter	Codes	QCDD		QBDD		QBDD	
Valve body	Code letters	QFB		QFB		QFB	
	Manufactured from to	03.00		03.00		03.00	
Number of plates		Inner	Outer	Inner	Outer	Inner	Outer
Clutch -K1-		5	5	5	5	5	5
Clutch -K2-		5	5	4	4	4	4
Clutch -K3-		6	5	5	4	5	4
Brake -B1-		6	6	5	5	5	5
Brake -B2-		5	6	4	5	4	5
Application	Model	New Beetle 1998		New Beetle 1998		New Beetle 1998	
	Engine	1.8 ltr. - 110 kW		2.0 ltr. - 85 kW		2.0 ltr. - 85 kW	

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Fig. 10: Transmission Codes FDC, FDF & FDG (1 Of 2)
Courtesy of VOLKSWAGEN UNITED STATES, INC.

Transmission	Codes		FDC	FDF	FDG
Ratios	1st gear		2.714	2.714	2.714
	2nd gear		1.441	1.551	1.441
	3rd gear		1.000	1.000	1.000
	4th gear		0.742	0.679	0.742
	Reverse gear		2.884	2.111	2.884
Intermediate drive	No. of teeth	Input gear	45	61	45
		Output gear	44	63	44
	Ratio		0.978	1.033	0.978
Final drive	No. of teeth	Pinion shaft	15	16	15
		Ring gear	68	78	68
	Ratio		4.533	4.875	4.533
Drive shaft	Flange dia. mm		Triple roller	Triple roller	Triple roller
ATF cooler	Equipment		Pressure-side 6-row	Pressure-side 6-row	Pressure-side 6-row

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Fig. 11: Transmission Codes FDC, FDF & FDG (2 Of 2)
Courtesy of VOLKSWAGEN UNITED STATES, INC.

Automatic transmission		01M					
Transmission	Codes	EPG		EPH		EPP	
	Manufactured from to	12.99 02.00		12.99 02.00		12.99	
Torque converter	Codes	QBDD		QBDD		QCDD	
Valve body	Codes	QFB		QFB		QFA	
	Manufactured from to	03.00		03.00		03.00	
Number of plates		Inner	Outer	Inner	Outer	Inner	Outer
	Clutch -K1-	5	5	5	5	5	5
	Clutch -K2-	4	4	4	4	5	5
	Clutch -K3-	5	4	5	4	6	5
	Brake -B1-	5	5	5	5	5	5
	Brake -B2-	4	5	4	5	5	6
Application	Model	New Beetle 1998		New Beetle 1998		New Beetle 1998	
	Engine	2.0 ltr. - 85 kW		2.0 ltr. - 85 kW		1.9 ltr. - 66 kW TDI	

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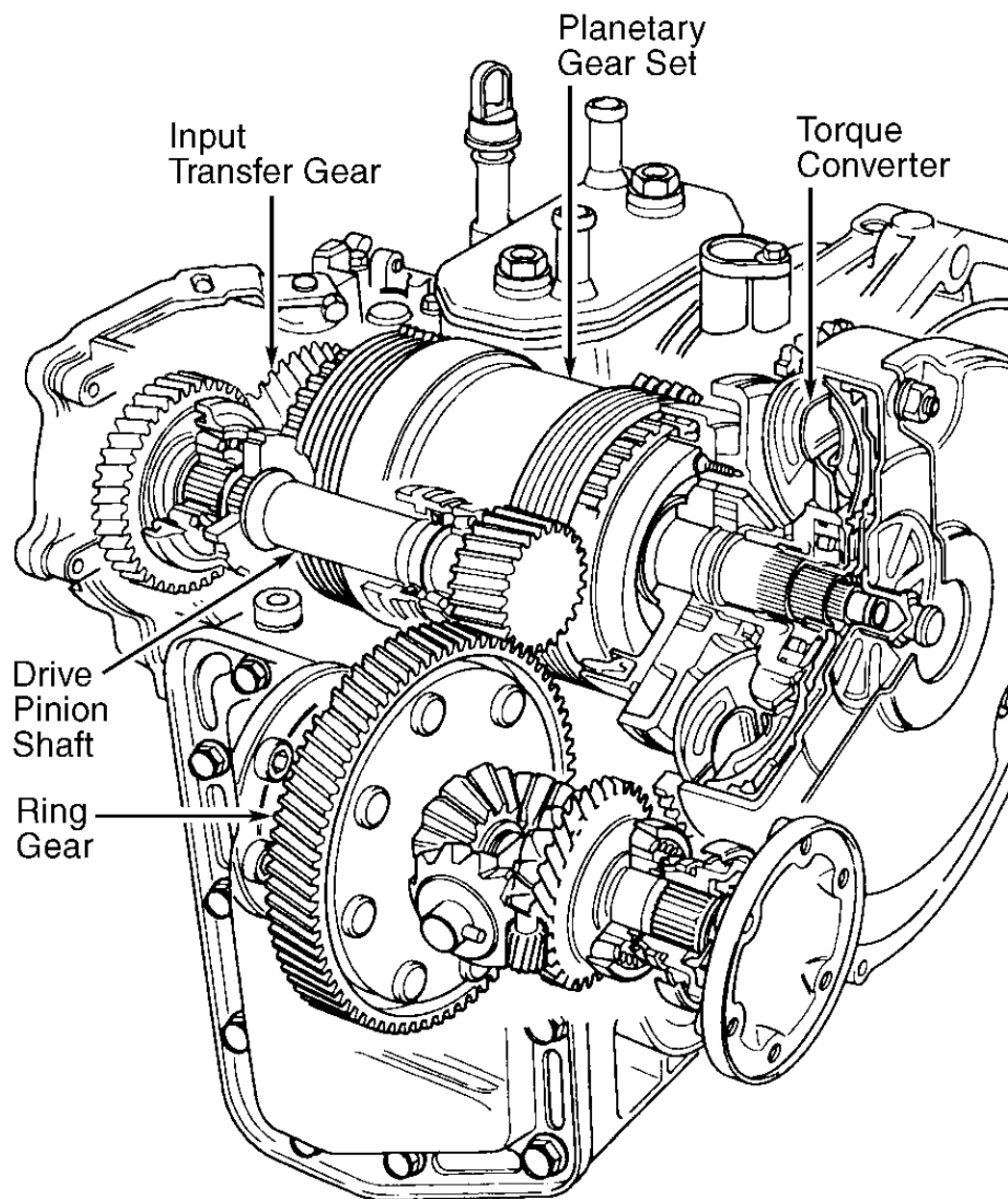
Fig. 12: Transmission Codes EPG, EPH & EPP (1 Of 2)
Courtesy of VOLKSWAGEN UNITED STATES, INC.

Transmission	Codes		EPG	EPH	EPP
Ratios	1st gear		2.714	2.714	2.714
	2nd gear		1.551	1.441	1.441
	3rd gear		1.000	1.000	1.000
	4th gear		0.679	0.742	0.742
	Reverse gear		2.111	2.884	2.884
Intermediate drive	No. of teeth	Input gear	61	45	45
		Output gear	63	44	44
	Ratio		1.033	0.978	0.978
Final drive	No. of teeth	Pinion shaft	16	15	22
		Ring gear	78	68	72
	Ratio		4.875	4.533	3.273
Drive shaft	Flange dia. mm		Triple roller	Triple roller	Triple roller
ATF cooler	Equipment		Pressure side 6-row	Pressure side 6-row	Pressure side 6-row

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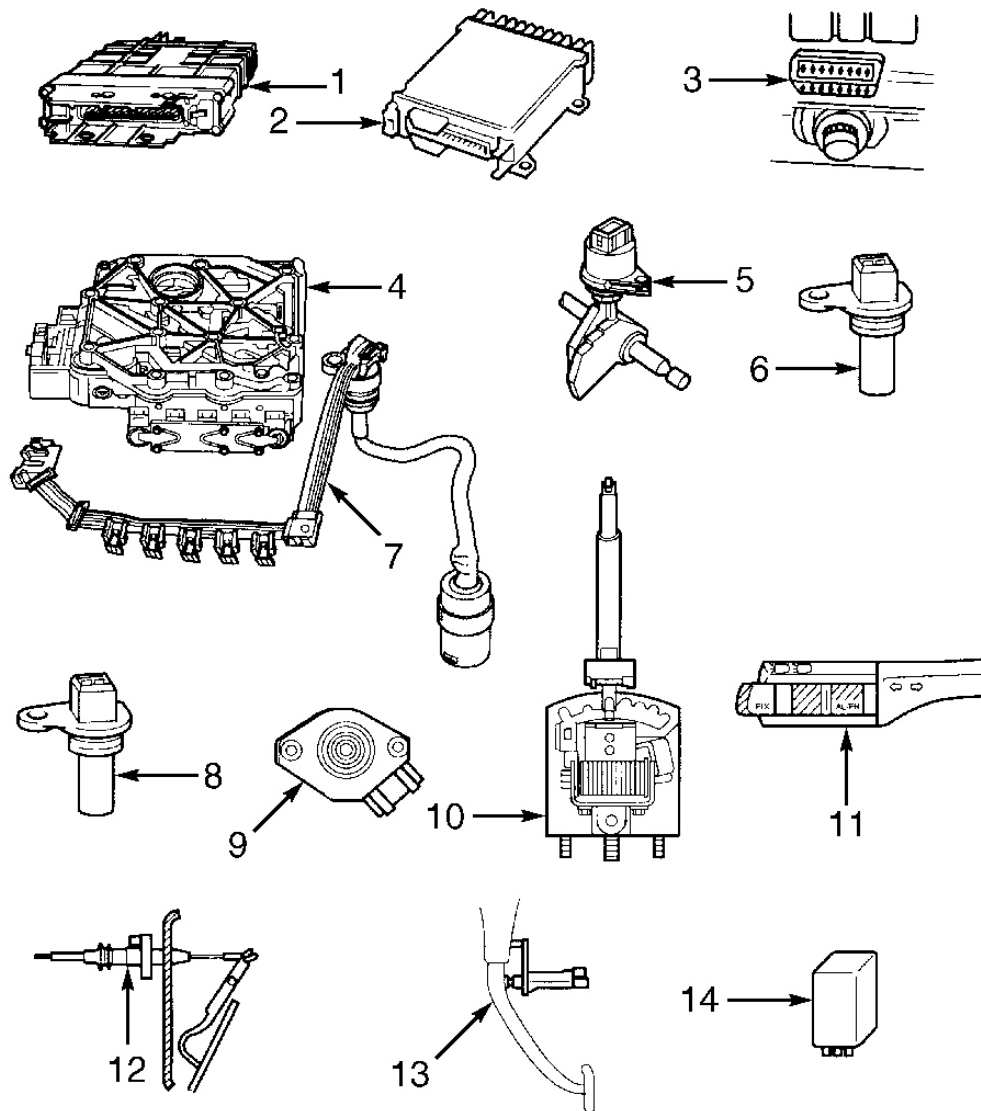
Fig. 13: Transmission Codes EPG, EPH & EPP (2 Of 2)
Courtesy of VOLKSWAGEN UNITED STATES, INC.

DESCRIPTION & OPERATION



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Fig. 14: Cross-Sectional View Of Transmission Components
Courtesy of VOLKSWAGEN UNITED STATES, INC.



- | | |
|--|--|
| 1. Transmission Control Module (TCM) | 7. Conductor Strip (With Integrated Transmission Fluid Temperature Sensor) |
| 2. Powertrain Control Module (PCM) | 8. Vehicle Speed Sensor (VSS) |
| 3. Data Link Connector (DLC) | 9. Throttle Position (TP) Sensor |
| 4. Valve Body | 10. Shift Lock Solenoid |
| 5. Transmission Range (TR) Switch | 11. Cruise Control Solenoid |
| 6. Transmission Vehicle Speed Sensor (VSS) | 12. Kickdown Switch |
| | 13. Brakelight Switch |
| | 14. Park/Neutral Position Relay |

Fig. 15: Identifying Transmission Control Module (TCM) & Shift Lock Electrical Components
Courtesy of VOLKSWAGEN UNITED STATES, INC.

TRANSMISSION

The 4-speed automatic transmission 01M is equipped with 4 hydraulically activated forward gears. When the lock-up clutch is closed these forward gears become mechanically driven gears by cutting-out the torque converter slip.

TORQUE CONVERTER

The torque converter is equipped with a lock-up clutch. The lock-up clutch is closed dependent on load and speed and drives 1st, 2nd, 3rd and 4th gears mechanically independent of slip.

In some cases, it may be necessary for installation of a new converter to remove the sleeve bearing from the turbine shaft.

ON BOARD DIAGNOSTIC (OBD)

It is recommended that the OBD be performed before and after each repair. See **DIAGNOSIS - 01M** article.

TRANSMISSION CONTROL MODULE

With Driving Situation Gear Changes (Fuzzy Logic)

Determining the driving situation and driving resistance dependent gear change point happens automatically.

Advantages:

- Gear changes will be consumption orientated
- Maximum engine output is always available
- Individual adaption of gear change points in all driving situations
- Gear change points are infinitely variable

Gear Change Point Variations For Hills

An additional gear change map automatically selects gear changes for hills dependent upon accelerator pedal position and driving speed.

Gear change map for extreme uphill stretches is matched to engine output.

Gear change map for extreme downhill stretches is matched to the braking effect of the engine.

LUBRICATION & ADJUSTMENTS

For lubrication and adjustments, see **SERVICING - A/T (01M)** article in TRANSMISSION SERVICING.

ON-VEHICLE SERVICE

AXLE SHAFTS

For information on axle shaft, see AXLE SHAFTS article in DRIVELINE/AXLES.

TRANSMISSION COMPONENTS

For information on components serviceable while transmission is installed in vehicle, see SERVICING - A/T (01M) article.

FINAL DRIVE, CHECKING OIL LEVEL

For final drive fluid level checking, see SERVICING - A/T (01M) article.

APPLY & BRAKE CLUTCH APPLICATION

NOTE: Before starting repairs to the transmission, first perform the On Board Diagnostic (OBD). See DIAGNOSIS - 01M article.

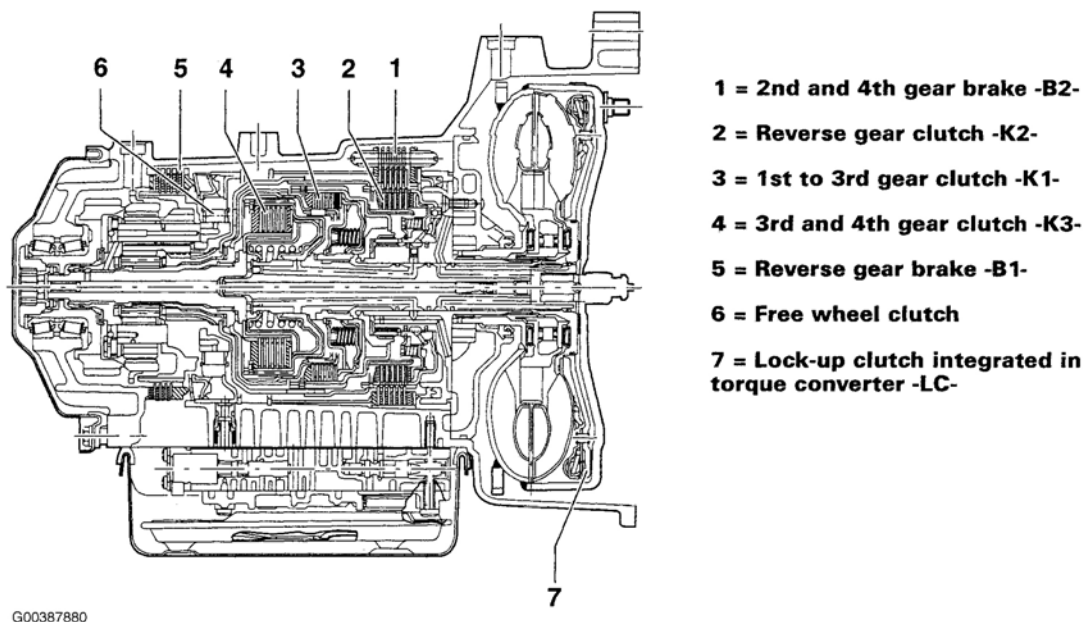


Fig. 16: Locating Selector Elements Position
Courtesy of VOLKSWAGEN UNITED STATES, INC.

POSITION OF SELECTOR ELEMENTS

Fig. 17 shows which selector elements are operated in the individual gears to help deal with complaints

regarding poor acceleration and speed performance or generally with drive train questions. The table makes it possible to determine which selector elements may not be operating properly.

All gears will be shifted hydraulically. All forward gears are driven mechanically at a predetermined load and speed via the torque converter lock-up clutch.

Gear	B1	B2	K1	K2	K3	F	LC
R	X			X			
1H			X			X	
1M			X			X	X
2H		X	X				
2M		X	X				X
3H			X		X		
3M			X		X		X
4H		X			X		
4M		X			X		X

X = clutches, brakes or freewheel engaged

H = hydraulic

M = mechanical

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Fig. 17: Position Of Selector Elements

Courtesy of VOLKSWAGEN UNITED STATES, INC.

TRANSMISSION CHECKING

All functions which could previously be performed with V.A.G 1551/1552 can also be performed with the new tester VAS 5051 in the vehicle self-diagnosis operating mode.

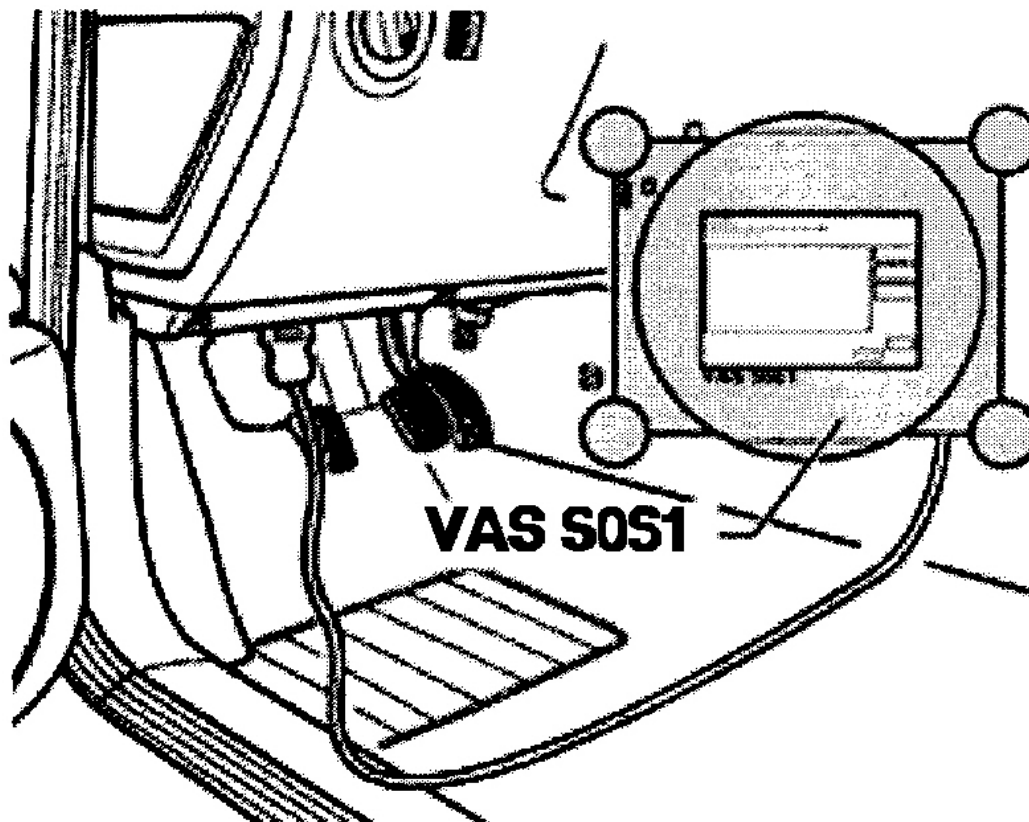
VEHICLE DIAGNOSIS, TESTING AND INFORMATION SYSTEM VAS 5051 CONNECTING

Special Tools And Equipment

- VAS 5051 Vehicle diagnosis, testing and information system

Connecting VAS 5051

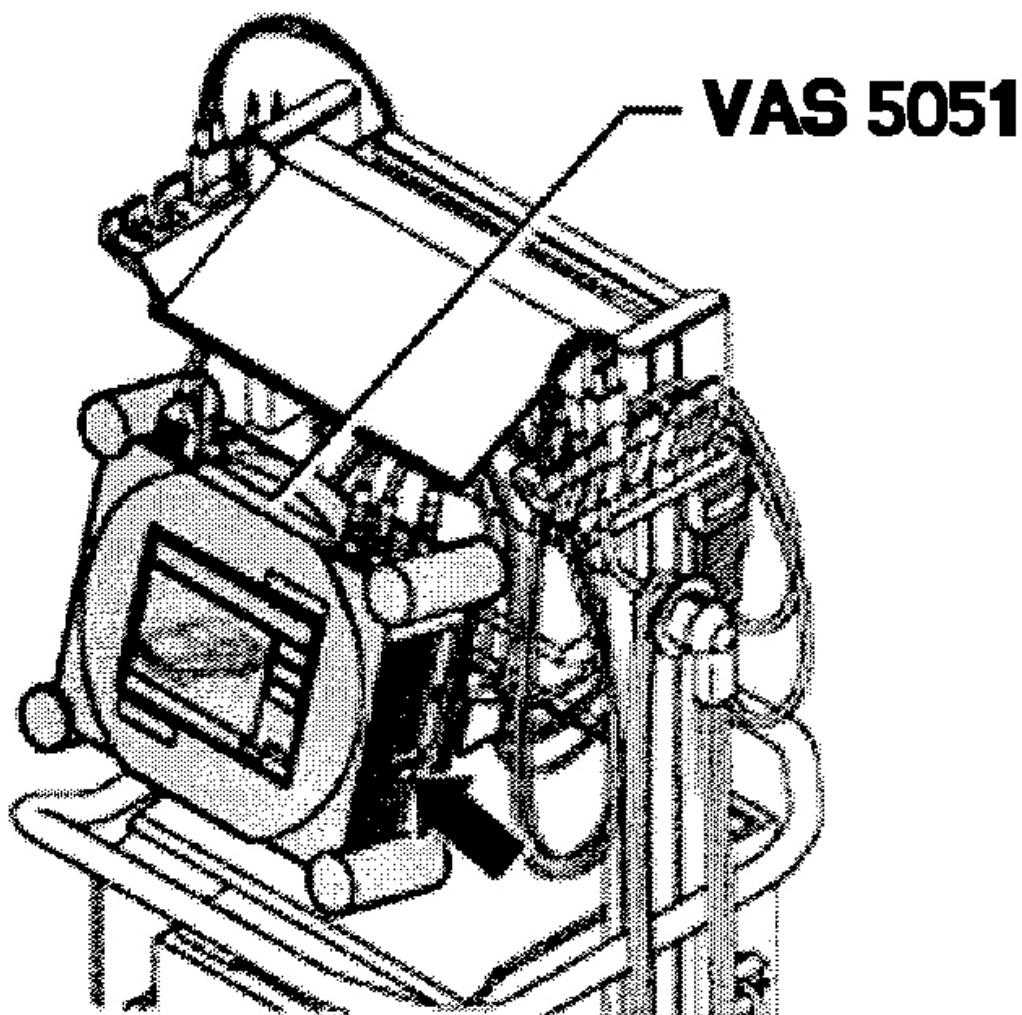
With ignition switched off, connect tester VAS 5051 to diagnosis connection using diagnosis cable VAS 5051/1 or VAS 5051/3. See **Fig. 18** .



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Fig. 18: Connecting Diagnostic Cable To DLC
Courtesy of VOLKSWAGEN UNITED STATES, INC.

Switch on tester -arrow-. See **Fig. 19** . The tester requires approx. 3 minutes to warm up.



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Fig. 19: Identifying Tester (VAS 5051)

Courtesy of VOLKSWAGEN UNITED STATES, INC.

Switch ignition on.

Select zone "Vehicle self-diagnosis" on touch screen.

NOTE: The automatic transmission is only to be checked AFTER having first completed the self-diagnosis and the cause of damage cannot be located and corrected. See DIAGNOSIS - 01M article.

MAIN PRESSURE CHECKING

Conditions For Performing Check

- Diagnostic Trouble Code (DTC) memory checked

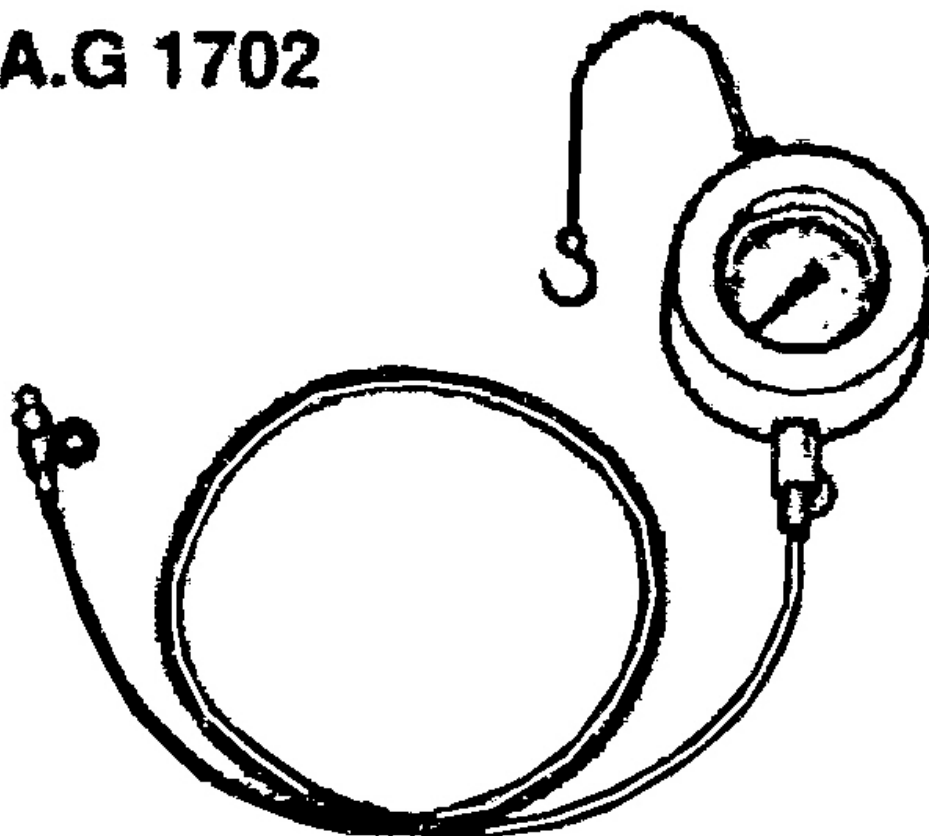
When the DTC memory is checked, the following display should appear: "No DTC recognized!"

- ATF level OK

Special Tools And Equipment

- VAG 1702 Pressure tester

V.A.G 1702

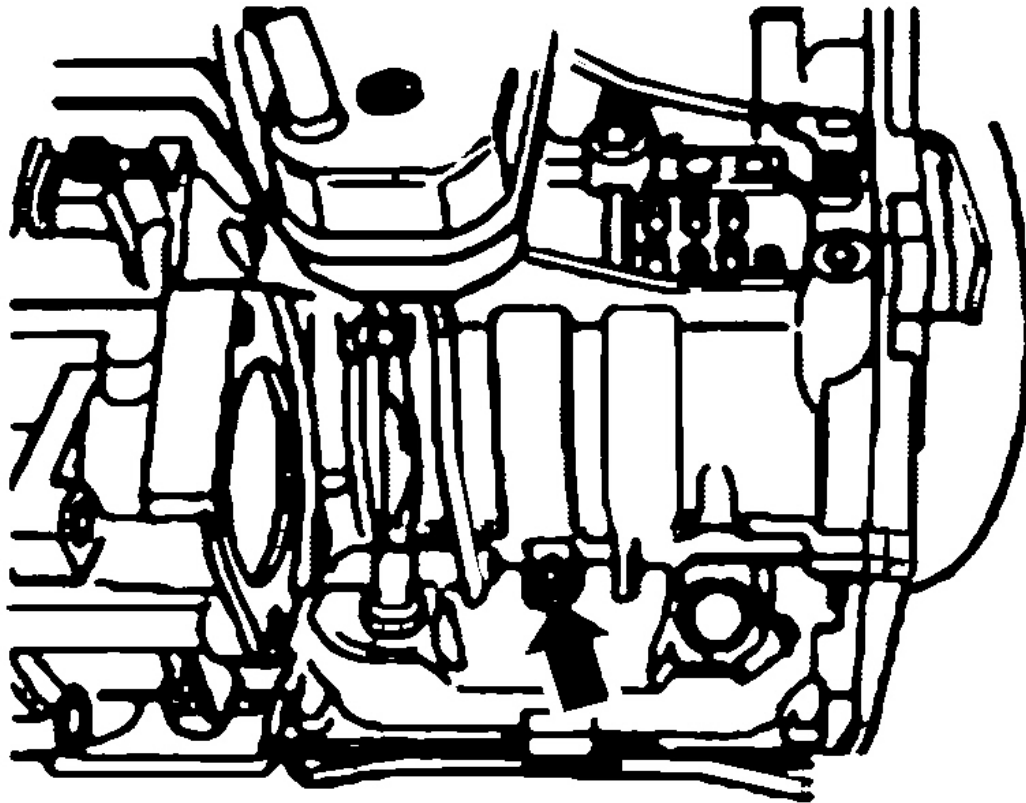


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Fig. 20: Identifying Pressure Tester
Courtesy of VOLKSWAGEN UNITED STATES, INC.

Main Pressure Checking

Remove bolt -arrow- for main pressure port. Always replace bolt. See **Fig. 21** .



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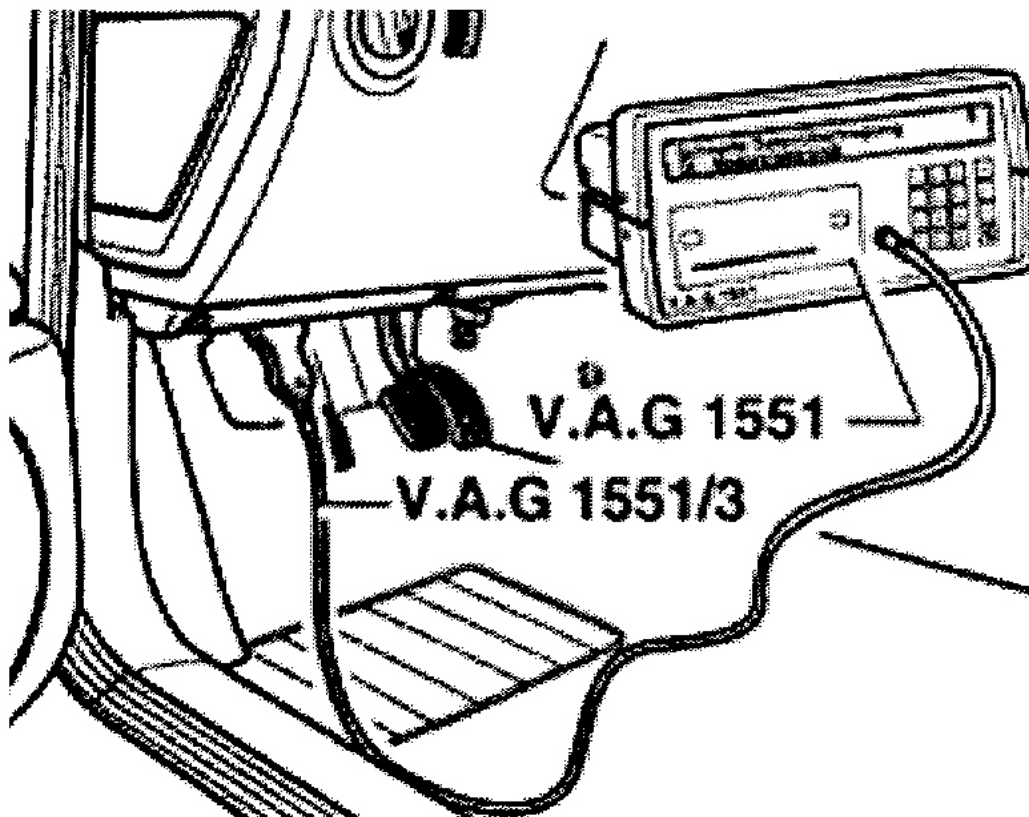
Fig. 21: Locating Main Pressure Port Bolt
Courtesy of VOLKSWAGEN UNITED STATES, INC.

Connect pressure tester VAG 1702 and tighten thumb screw.

Start engine.

Bleed pressure tester VAG 1702 by loosening thumb screw and tighten when bleeding is complete.

If V.A.G 1551 is used: With ignition switched off, connect V.A.G 1551 Scan Tool with diagnosis cable V.A.G 1551/3A. See **Fig. 22** .



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Fig. 22: Connecting Diagnostic Cable (VAG 1551/3A)
Courtesy of VOLKSWAGEN UNITED STATES, INC.

Indicated on display:

- VAG - ON BOARD DIAGNOSTIC HELP
- 1 - Rapid data transfer (appears alternately)
- 2 - Blink code output (appears alternately)

Start engine.

Press key 1 for "Rapid data transfer" mode.

Indicated on display:

- Rapid data transfer HELP

- Enter address word XX

Press keys 0 and 2 to select address word "Transmission electronics".

Indicated on display:

- Rapid data transfer Q
- 02 - Transmission electronics

Confirm entry with key Q.

Indicated on display:

- Rapid data transfer HELP
- Select function XX

Press keys 0 and 8 to select function "Read measured value block".

Indicated on display:

- Rapid data transfer Q
- 08 - Read measured value block

Confirm entry with key Q.

Indicated on display:

- Read measured value block
- Enter display group number XXX

Press keys 0 0 5 to select "Display group number 005".

Confirm entry with key Q.

Indicated on display (values shown are for example):

- Read measured value block 5 "right arrow"
- 30° C 0011011 0 900 RPM

The first display zone shows the ATF temperature.

Allow ATF temperature to rise to 60° C.

For main pressure specifications at idle, see **Fig. 23** .

	Selector lever positions	
	D Idle	R Idle
Pressure in bar	3.4 to 3.8	5 to 6

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Fig. 23: Identifying Main Pressure Specifications At Idle
Courtesy of VOLKSWAGEN UNITED STATES, INC.

If there are deviations from prescribed values, the following could be the cause: See **Fig. 24** .

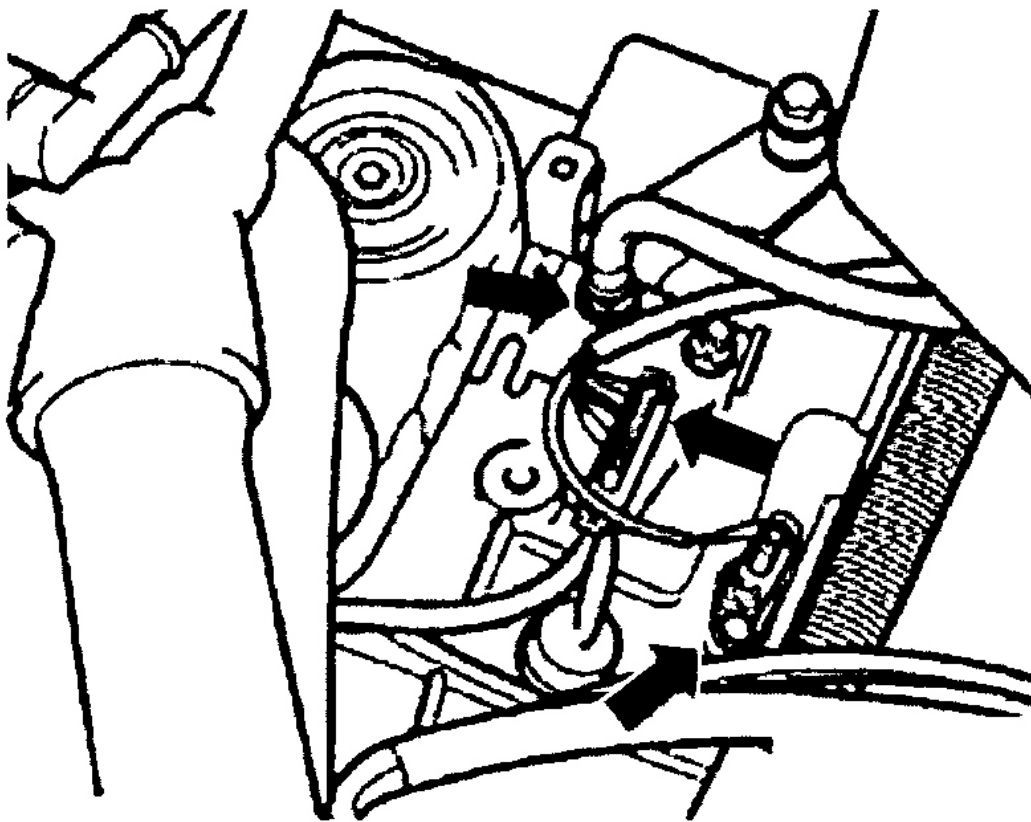
Possible causes	Remedy
Idling speed too high	Adjust engine
ATF pump faulty	Check ATF pump and replace if necessary
Sticking valves in valve body	Replace valve body

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Fig. 24: Possible Causes & Remedies Of Deviations At Idle
Courtesy of VOLKSWAGEN UNITED STATES, INC.

Switch engine off.

Press fuse together and pull off solenoid valve connector. See **Fig. 25** .



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Fig. 25: Identifying Solenoid Valve Connector
Courtesy of VOLKSWAGEN UNITED STATES, INC.

Start engine.

	Selector lever positions and test conditions	
	D	R
	Engine speed ca. 2000 rpm	Engine speed ca. 2000 rpm
Pressure in bar	12.4 to 13.2	23.0 to 24.0

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Fig. 26: Identifying Main Pressure Specifications At 2000 RPM
Courtesy of VOLKSWAGEN UNITED STATES, INC.

If possible, main pressure test should be performed on a rolling road.

If there are deviations from the prescribed values, the following could be the cause. See **Fig. 27** .

Possible causes	Remedy
ATF pump faulty	Check ATF pump and replace if necessary
Sticking valves in valve body	Replace valve body

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Fig. 27: Identifying Causes & Remedies Of Deviations At 2000 RPM
Courtesy of VOLKSWAGEN UNITED STATES, INC.

After test: Disconnect pressure tester VAG 1702.

Install new bolt for main pressure port and tighten to 15 Nm.

Install solenoid valve connector.

Once connector has been fitted, check and erase DTC memory.

If necessary, install sound insulation.

REPAIR INSTRUCTIONS

The maximum possible care and cleanliness and proper tools are essential to ensure satisfactory and successful transmission repairs. The usual basic safety precautions also apply when repairing the vehicle.

A number of generally applicable instructions for individual repair operations, which are otherwise mentioned at various points in the overhaul are summarized here.

BATTERY DISCONNECTING & RECONNECTING

CAUTION: Before beginning repairs on the electrical system:

- **Obtain anti-theft radio security code.**
- **Switch off all electrical consumers.**
- **Switch ignition off and remove ignition key.**
- **Do not loosen or remove ground strap from body. Disconnect terminal from battery only.**

For work steps required after reconnecting battery, see **Fig. 28** .

Work steps	completed?
Diagnostic Trouble Code (DTC) Memory: Check using VAS 5051 Tester in mode "Guided Fault Finding".	
Power windows (where applicable): Completely open and close all power windows.	
Radio: Input anti-theft radio code and check radio, CD & tape player functions as applicable.	
Clock: Check and reset to local time.	
All electrical consumers: Check function.	

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Fig. 28: Reconnecting Battery Work Steps
 Courtesy of VOLKSWAGEN UNITED STATES, INC.

NOTE: If desired, print this page and use the table above as a checklist.

TRANSMISSION

When an automatic transmission is replaced, the ATF in the planetary gearbox, and the gear oil in the final drive must be checked and topped off as necessary. See **SERVICING - A/T (01M)** article.

GASKETS, OIL SEALS

Radial shaft seals: Pack space between sealing lips with grease before installing.

Always install new O-rings.

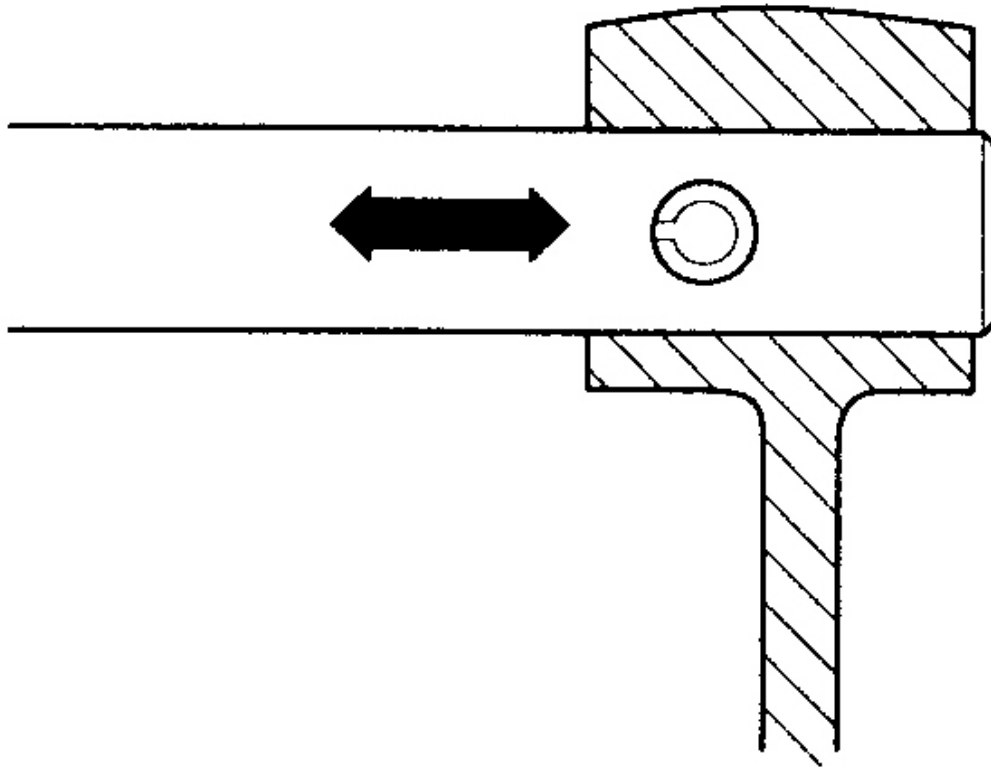
After installing, check ATF level in planetary gearbox or gear oil in final drive, adjust to correct level if necessary. See **SERVICING - A/T (01M)** article.

LOCKING ELEMENTS

Do not overstretch circlips; replace if necessary.

Circlips must be properly seated in the grooves.

Replace spring pins. Installation position: Slot must be longitudinal to line of force.



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Fig. 29: Positioning Slotted Spring Pins
Courtesy of VOLKSWAGEN UNITED STATES, INC.

SHIMS

Measure shims at several points with a micrometer. Different tolerances make it possible to obtain the exact shim thickness required.

Check for signs of burr and damage. Install only shims which are in perfect condition.

BEARINGS

Tapered roller bearings are allocated in the parts catalog according to the transmission build date and code letters.

Always replace tapered roller bearings which are mounted on a shaft together and use bearings from a single

manufacturer.

Install needle bearings with the inscribed side (thicker sheet metal) facing the drift.

Heat the inner races of tapered roller bearings to approx. 100° C before installing.

Do not interchange the inner and outer races of same size bearings.

NUTS, BOLTS

Nuts and bolts for attaching covers and housings must be loosened and tightened in a crosswise pattern.

Do not distort particularly sensitive parts (e.g. valve body), and loosen or tighten diagonally in stages.

The tightening torques stated apply to uncoiled nuts and bolts.

Threads of bolts that are secured by locking fluid are to be cleaned with a wire brush. Then insert bolts with AMV 185 100 A1.

Always replace self-locking nuts.

INNER PLATES

Place new inner plates in ATF fluid for 15 minutes before installing.

VALVE BODY

Replace the valve body if any of the selector elements are scorched.

CLUTCHES

Clutches K1, K2 and K3 should be disassembled only for cleaning. If parts are faulty, replace the clutch. Allocate clutches according to transmission code letters.

ON BOARD DIAGNOSTIC (OBD)

Before repair work on the automatic transmission, the cause of the malfunction should be determined as precisely as possible with the aid of On Board Diagnostic (OBD). See **DIAGNOSIS - 01M** article.

TRANSMISSION

For removal and installation procedure, see **REMOVAL & INSTALLATION - A/T (01M)** article.

For transmission repairs, an exchange component is available for the shift elements, which is often more cost effective.

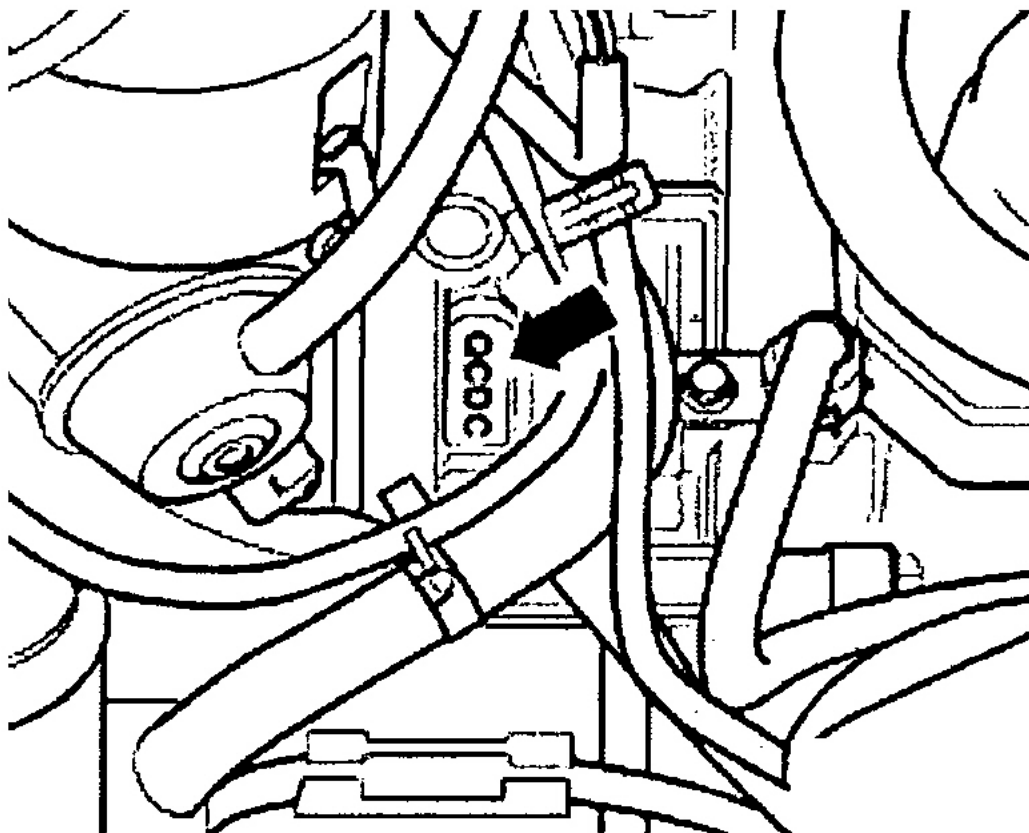
When installing a transmission, make sure that the dowel sleeves are installed correctly.

TORQUE CONVERTER

The ATF pump is driven via the torque converter.

When installing the torque converter, ensure that both drive pins engage in the recesses in the ATF pump inner wheel.

There are different types of torque converter, which can be identified by the code letters (arrow). See **Fig. 30** . For more information, see **CODE LETTERS, TRANSMISSION APPLICATION, RATIOS, EQUIPMENT** .



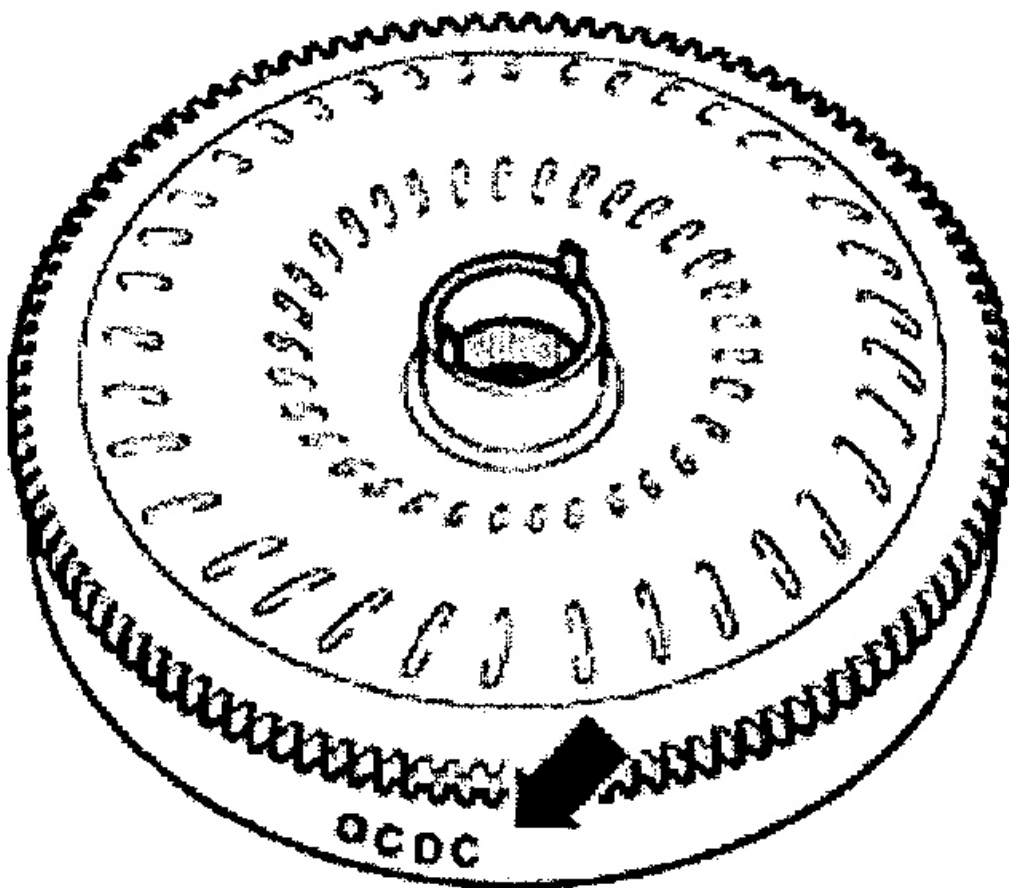
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Fig. 30: Locating Torque Converter ID
Courtesy of VOLKSWAGEN UNITED STATES, INC.

TORQUE CONVERTER IDENTIFICATION

There are different types of torque converter. Current torque converter with sleeve bearing in turbine shaft of transmission. New torque converter with integrated needle bearing. Identification is by means of the code letters. See **CODE LETTERS, TRANSMISSION APPLICATION, RATIOS, EQUIPMENT** .

The current torque converter may only be installed in a transmission with a sleeve bearing in the turbine shaft. It can be identified by the fourth letter, which is either a B, C, R, T or V. See **Fig. 31** .

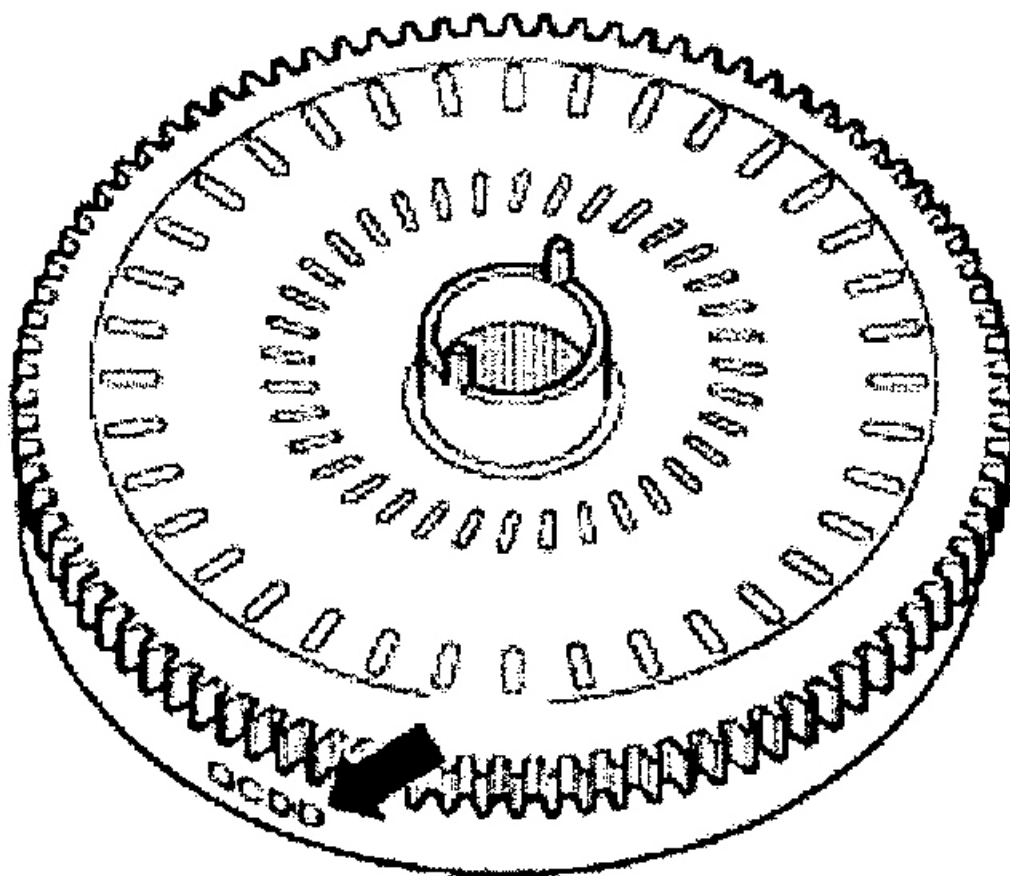


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Fig. 31: Identifying Current Torque Converter
Courtesy of VOLKSWAGEN UNITED STATES, INC.

NOTE: Example (arrow) is a "C". See **Fig. 31** .

The new torque converter may only be installed in a transmission without a sleeve bearing in the turbine shaft. It can be identified by the fourth letter, which is either a D, H, or J. See **Fig. 32** . Example (arrow) is a "D".



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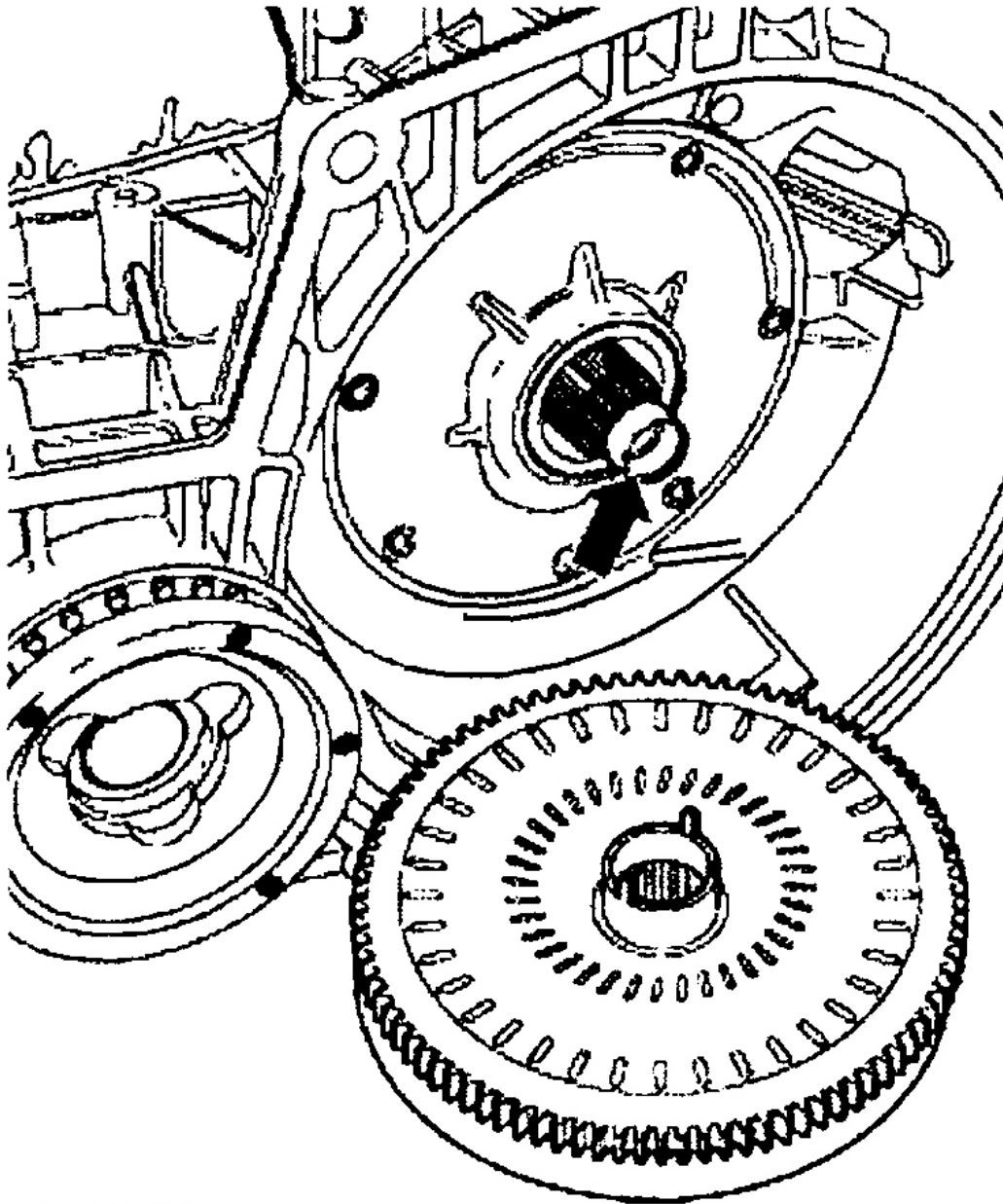
Fig. 32: Identifying New Torque Converter
Courtesy of VOLKSWAGEN UNITED STATES, INC.

NOTE: If a new torque converter with an integrated needle bearing is installed in a transmission with a sleeve bearing in the turbine shaft, the sleeve bearing must be removed.

TORQUE CONVERTER APPLICATIONS

There are two types, which are allocated according to the transmission code letters. See **CODE LETTERS, TRANSMISSION APPLICATION, RATIOS, EQUIPMENT** .

Current torque converter with sleeve bearing in the turbine shaft of the transmission (arrow). See **Fig. 33** .



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Fig. 33: Identifying Torque Converter with Sleeve Bear
Courtesy of VOLKSWAGEN UNITED STATES, INC.

For the new torque converter with an integrated needle bearing, a sleeve bearing (arrow) may not be installed in

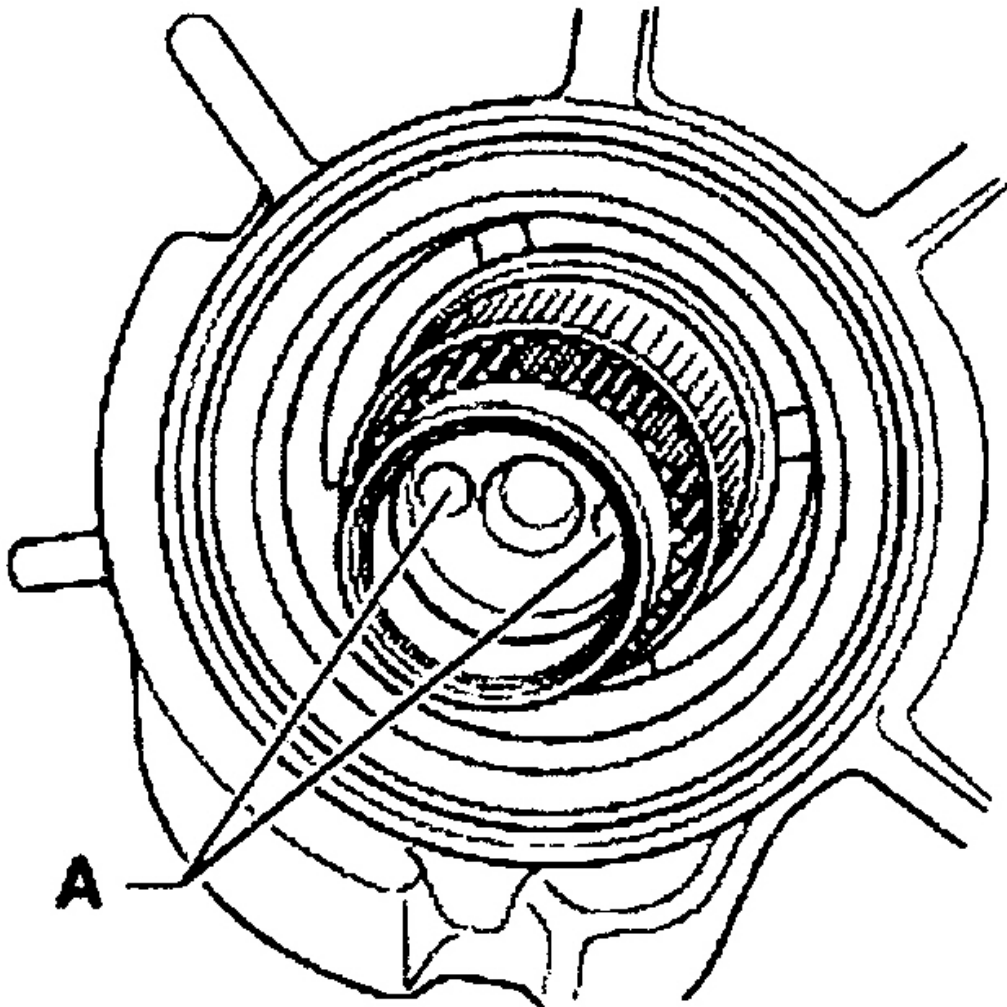
the turbine shaft of the transmission with this type. Remove if necessary.

Removing Sleeve Bearing From Turbine Shaft

Place transmission in its installation position on transmission oil pan.

Remove torque converter.

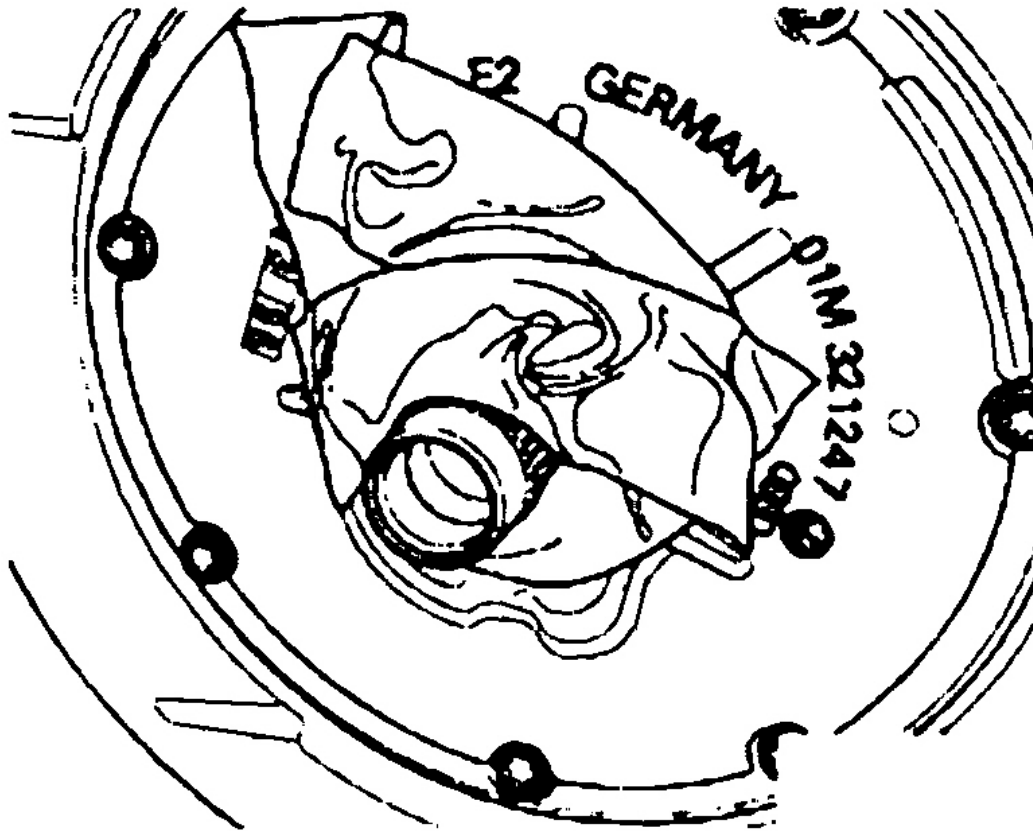
Position holes -A- of turbine shaft in horizontal position. See **Fig. 34** .



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Fig. 34: Locating Turbine Shaft Holes
Courtesy of VOLKSWAGEN UNITED STATES, INC.

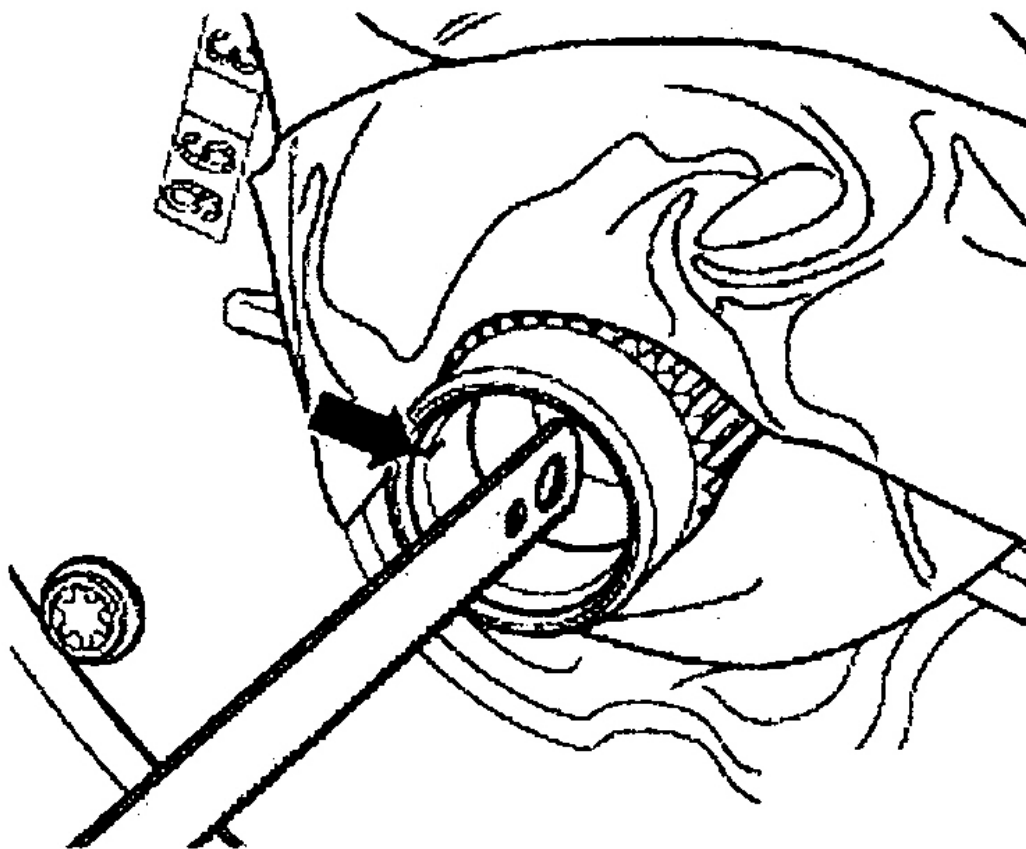
Protect transmission by carefully taping around turbine shaft and over holes. See **Fig. 35** .



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Fig. 35: Taping Around Turbine Shaft
Courtesy of VOLKSWAGEN UNITED STATES, INC.

Saw through sleeve bearing using a saw blade. Do NOT saw at thrust point of sleeve bearing (arrow). See **Fig. 36** .

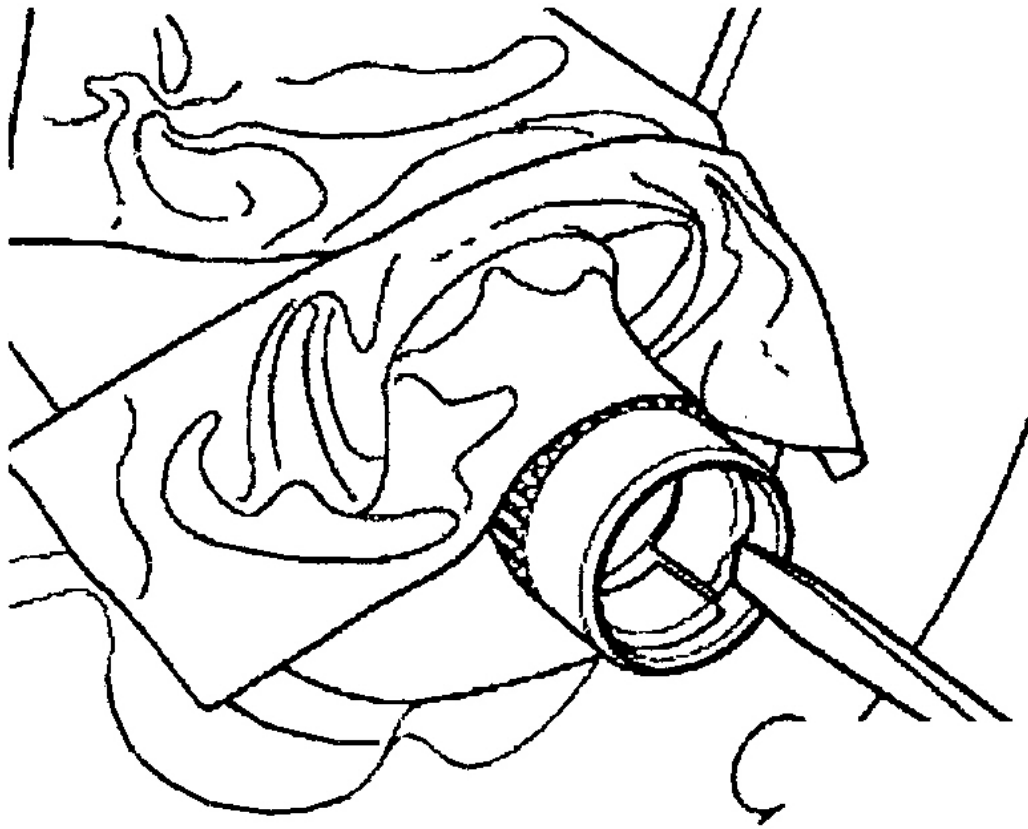


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Fig. 36: Sawing Through Sleeve Bearing
Courtesy of VOLKSWAGEN UNITED STATES, INC.

NOTE: Make sure that no filings enter the transmission.

Without damaging turbine shaft, carefully pry up split sleeve bearing using a screwdriver. See **Fig. 37** .



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Fig. 37: Prying Sleeve Bearing

Courtesy of VOLKSWAGEN UNITED STATES, INC.

Remove filings and sticky tape.

Replace torque converter seal.

TORQUE CONVERTER OIL SEAL, REMOVING AND INSTALLING

Special Tools And Equipment

- VW 681 Extractor lever
- 3158 Drift sleeve

Removing & Installing Torque Converter Oil Seal

VW 681

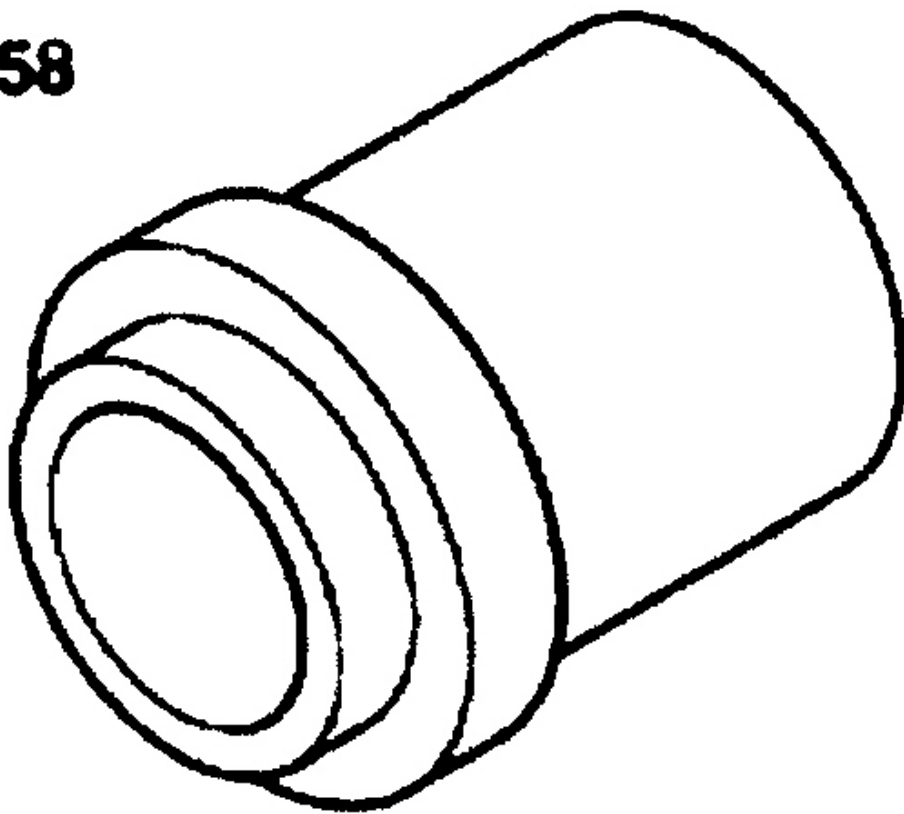


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Fig. 38: Identifying Extractor Lever

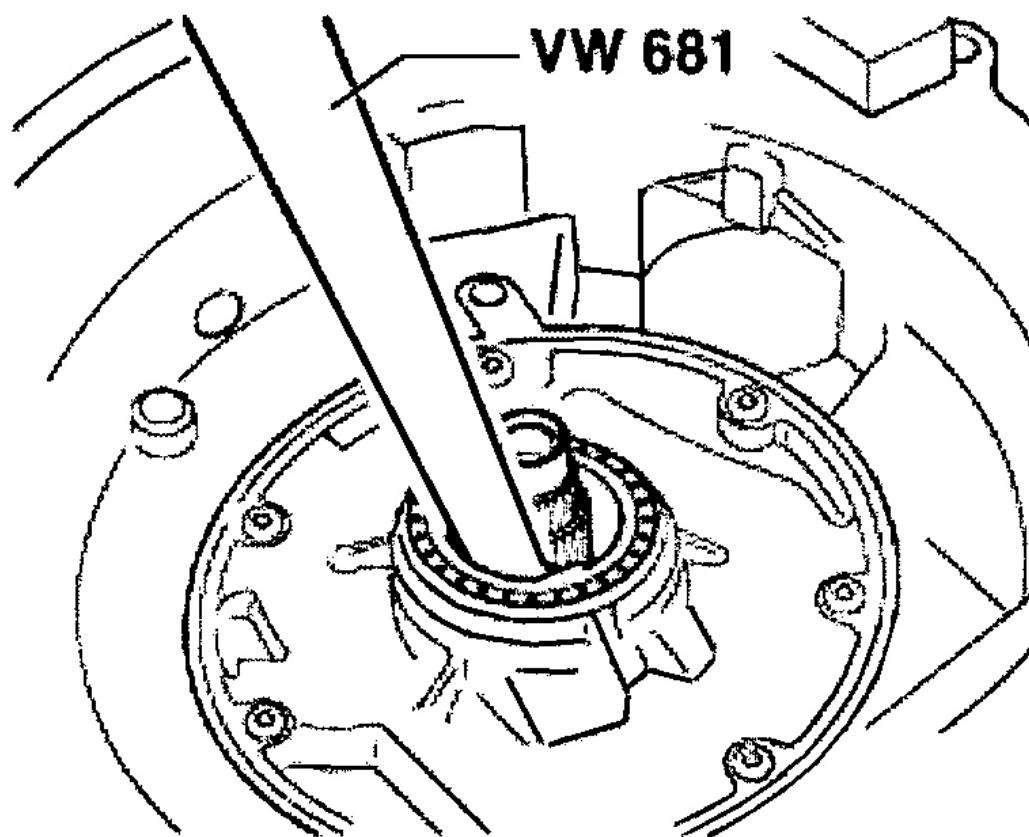
Courtesy of VOLKSWAGEN UNITED STATES, INC.

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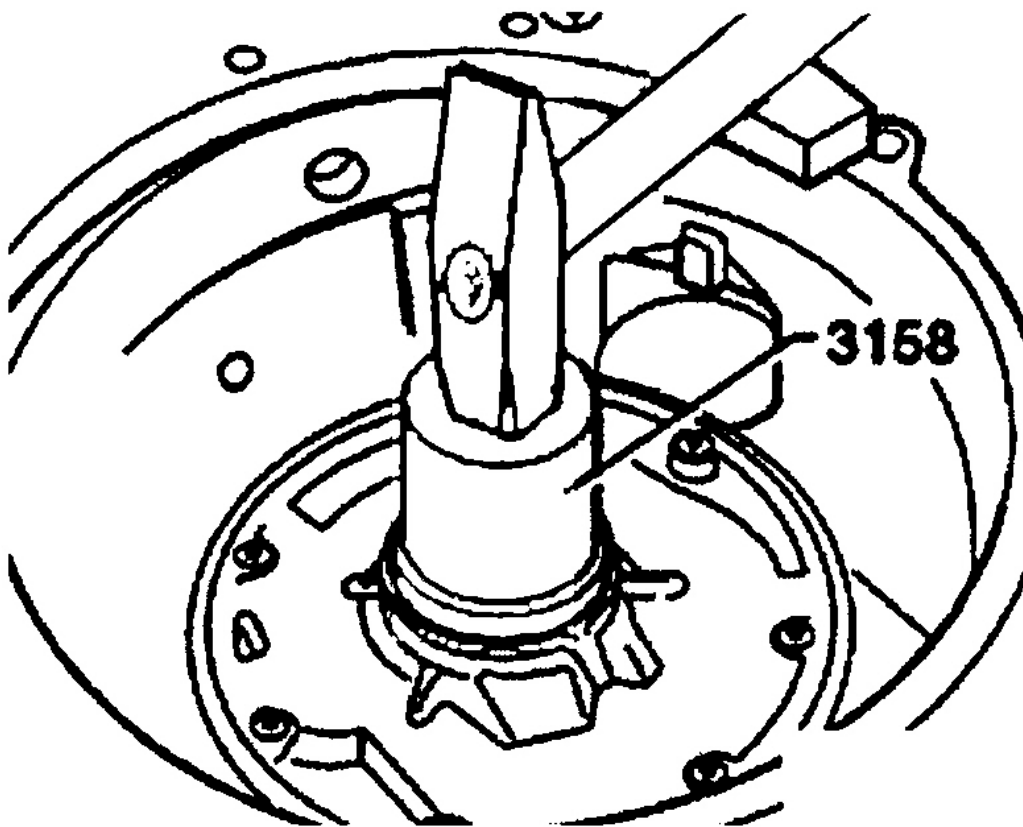
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Fig. 39: Identifying Drift Sleeve
Courtesy of VOLKSWAGEN UNITED STATES, INC.



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Fig. 40: Removing Torque Converter Oil Seal
Courtesy of VOLKSWAGEN UNITED STATES, INC.



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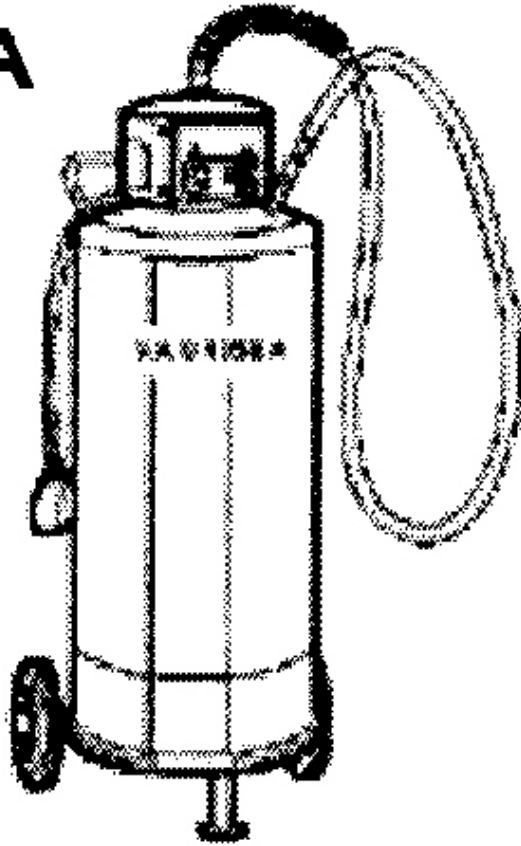
Fig. 41: Driving In Torque Converter Oil Seal
Courtesy of VOLKSWAGEN UNITED STATES, INC.

TORQUE CONVERTER, DRAINING

Special Tools And Equipment

- VAG 1358 A Oil extractor

V.A.G 1358 A



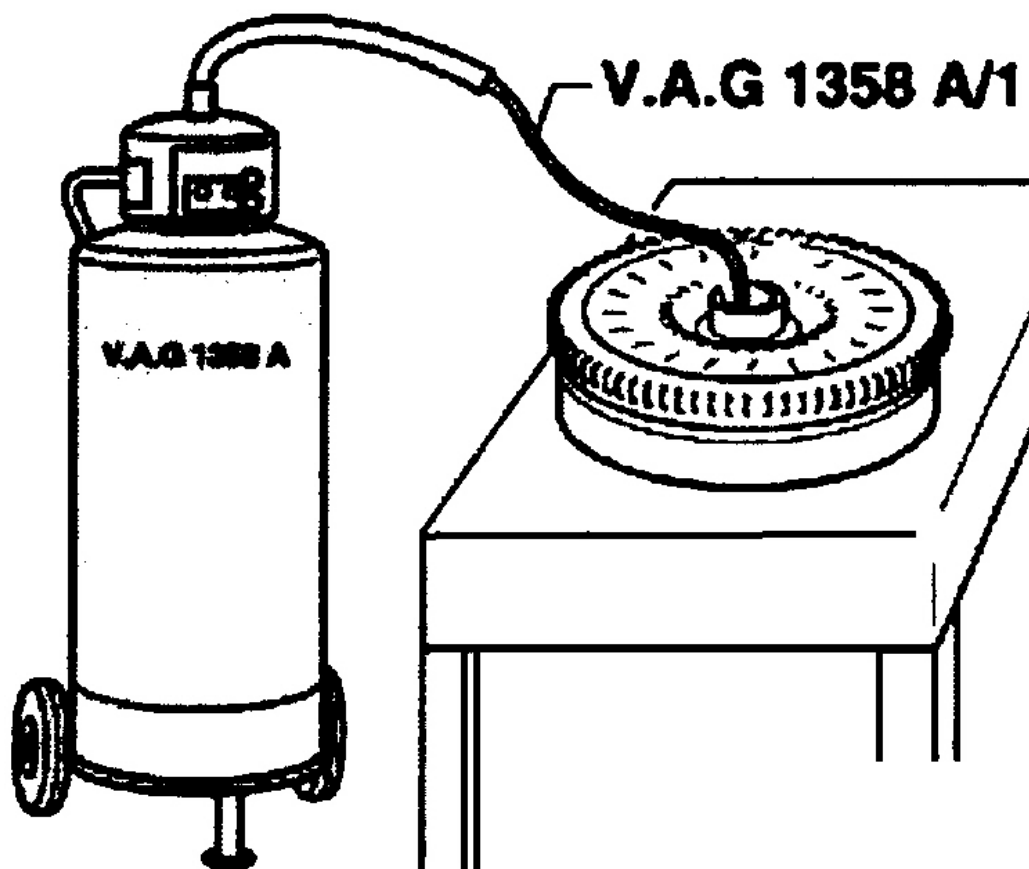
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Fig. 42: Identifying Oil Extractor

Courtesy of VOLKSWAGEN UNITED STATES, INC.

If the torque converter has become fouled by abrasion or if performing a major overhaul of the transmission, drain the torque converter as follows:

Extract ATF from torque converter using VAG 1358 A and probe VAG 1358 A/1. See **Fig. 43** .

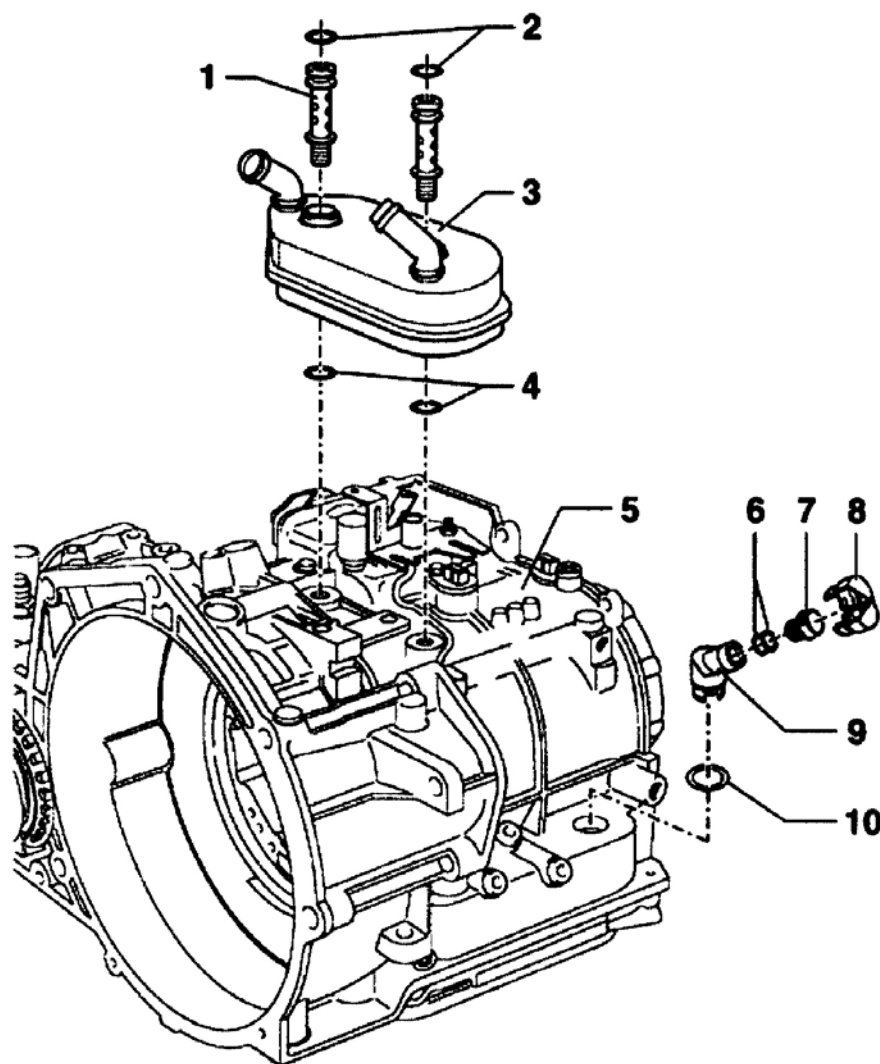


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Fig. 43: Extracting ATF From Torque Converter
Courtesy of VOLKSWAGEN UNITED STATES, INC.

TRANSMISSION DISASSEMBLY AND ASSEMBLY

ATF COOLER AND ATF FILLER TUBE, REMOVING AND INSTALLING



1 - Banjo bolt, 35 Nm

2 - O-ring

◆ Always replace

3 - ATF cooler

4 - O-ring

◆ Always replace

5 - Transmission housing

6 - Seal

◆ Always replace

7 - Plug

8 - Cap

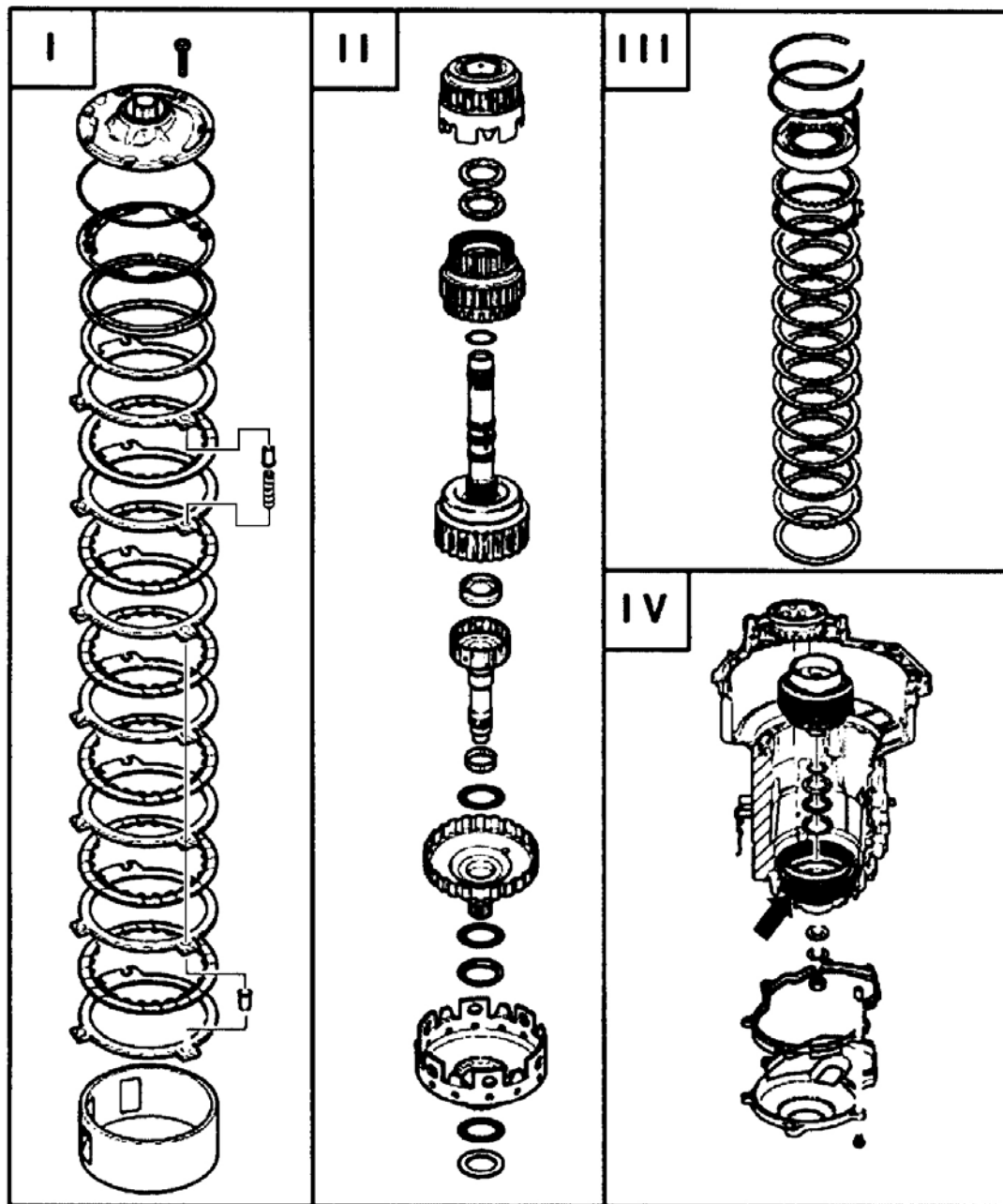
9 - ATF filler tube

10 - O-ring

◆ Always replace

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Fig. 44: Removing & Installing ATF Cooler & ATF Filler
 Courtesy of VOLKSWAGEN UNITED STATES, INC.



Note: It is not necessary to remove input gear (arrow).

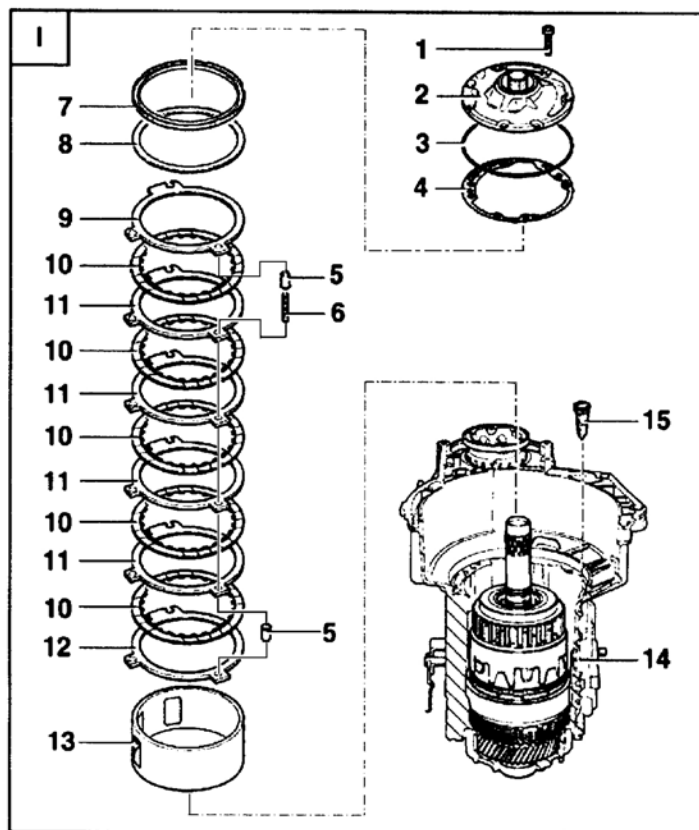
- I - ATF Pump To Support Tube
- II - Reverse Clutch To Large Sun Gear
- III - Freewheel & Reverse Gear Brake
- IV - Planet Carrier

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Fig. 45: Exploded Views Of Transmission Components
 Courtesy of VOLKSWAGEN UNITED STATES, INC.

ATF PUMP TO SUPPORTING TUBE, REMOVING AND INSTALLING

Number of inner and outer plates varies based on transmission code. For correct number used, see **CODE LETTERS, TRANSMISSION APPLICATION, RATIOS, EQUIPMENT** .



1 - Bolt

- ◆ Qty. 7
- ◆ Tighten to 8 Nm and turn 90° further
- ◆ The turning further of 90° may be done in several stages

2 - ATF pump with -B2- piston

- ◆ Replacement part is assigned according to transmission code letters

3 - O-ring

- ◆ Always replace
- ◆ Place on ATF pump

4 - Gasket

- ◆ Always replace

5 - Spring cap, Qty. 6

- ◆ Install 3 spring caps after installing first outer plate
- ◆ Install 3 spring caps before installing last outer plate

6 - Spring

- ◆ Qty. 3

7 - Retaining ring

8 - Shim

9 - Outer plate -B2-

- ◆ 3 mm thick

10 - Inner plate -B2-

- ◆ Before installing place new inner plates in ATF for 15 minutes

11 - Outer plate -B2-

- ◆ Always install 2 mm thick outer plates

12 - Outer plate -B2-

- ◆ Install 3 mm thick outer plate to supporting tube

13 - Supporting tube -B2-

- ◆ For -B2- plate package
- ◆ Replacement part is assigned according to transmission code letters
- ◆ Insert so that groove engages in wedge of freewheel

14 - Transmission housing with clutches installed

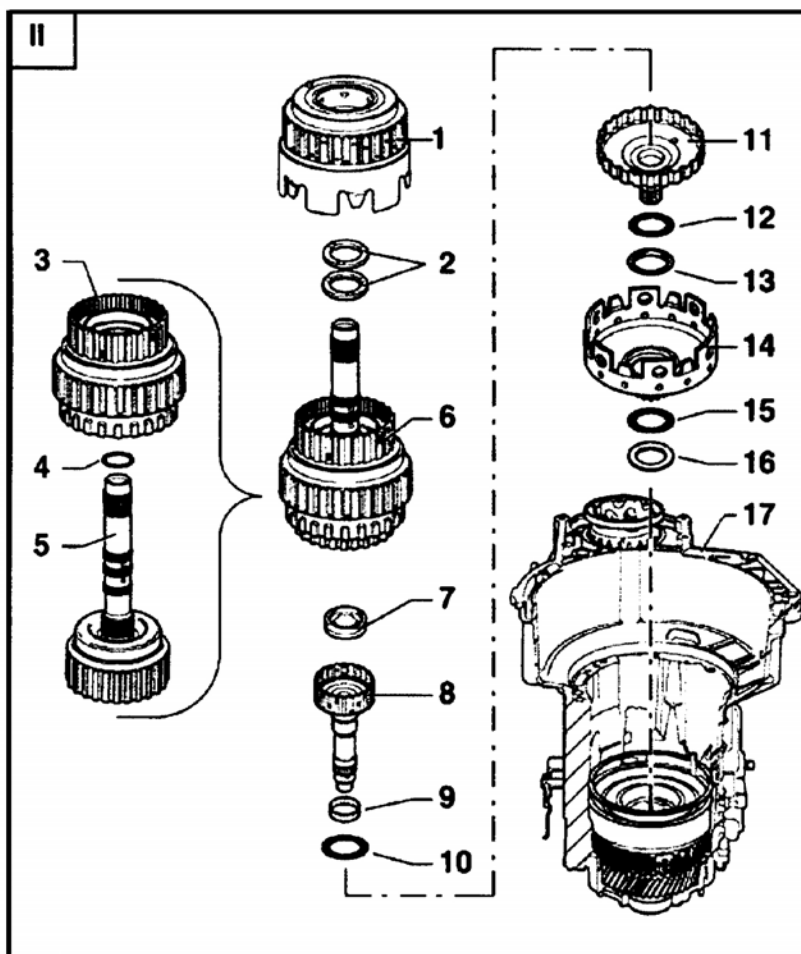
15 - Strainer

- ◆ Not installed until transmission manufacture date 14 02 0.

Fig. 46: Removing & Installing ATF Pump To Supporting Tube

Courtesy of VOLKSWAGEN UNITED STATES, INC.

REVERSE GEAR CLUTCH -K2- TO LARGE SUN GEAR, REMOVING AND INSTALLING



1 - Reverse gear clutch -K2-

2 - Shim

- ◆ Determining thickness-
See CLUTCH PLAY BETWEEN
-K1- AND -K2-, ADJUSTING

- ◆ 1 or 2 shims can be installed

3 - 1st to 3rd gear clutch -K1-

- ◆ Replacement part is assigned according
to transmission code letters
- ◆ The clutches -K1- and -K3- are pressed
together

4 - Seal

- ◆ Always replace

**5 - 3rd and 4th gear clutch -K3- with
turbine shaft**

- ◆ Replacement part is assigned according
to transmission code letters
- ◆ The clutches -K1- and -K3- are pressed together

**6 - 1st to 3rd gear clutch -K1- with 3rd and
4th gear clutch -K3-**

- ◆ The clutches -K1- and -K3- are pressed
together

7 - Axial needle bearing with washer

- ◆ Axial needle bearing faces small input
shaft

8 - Small input shaft

9 - Needle bearing

10 - Axial needle bearing

11 - Large input shaft

12 - Axial needle bearing

13 - Axial needle bearing washer

- ◆ With shoulder

14 - Large sun wheel

15 - Axial needle bearing

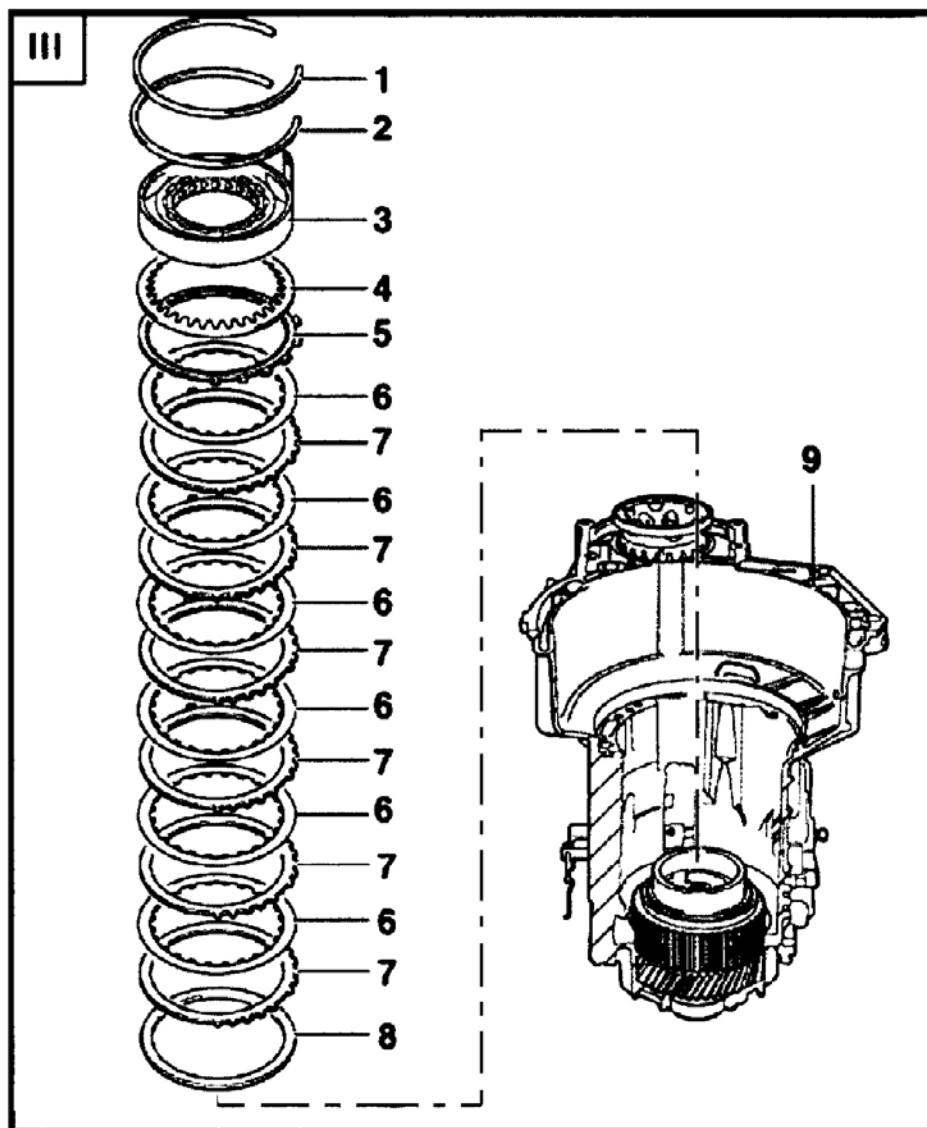
16 - Axial needle bearing washer

**17 - Transmission housing with freewheel
and circlips installed**

Fig. 47: Removing & Installing Reverse Gear Clutch To Large Sun Gear
Courtesy of VOLKSWAGEN UNITED STATES, INC.

FREEWHEEL AND REVERSE GEAR BRAKE -B1-, REMOVING AND INSTALLING

Number of inner and outer plates varies based on transmission code. For correct number used, see **CODE LETTERS, TRANSMISSION APPLICATION, RATIOS, EQUIPMENT** .



1 - Circlip

- ◆ For supporting tube -B2-
- ◆ Installation position: Circlip open ends faces freewheel retaining wedge

2 - Circlip

- ◆ For freewheel
- ◆ Installation position: Circlip open ends faces freewheel retaining wedge

3 - Freewheel with -B1- piston

- ◆ Before removing freewheel, remove valve body and sealing plugs

4 - Dished spring

- ◆ Install with convex facing freewheel

5 - Pressure plate -B1-

- ◆ Install with flat side facing plates
- ◆ Replacement part is assigned according to transmission code letters

6 - Inner plate, -B1-

- ◆ Before installing place plates in ATF for 15 minutes

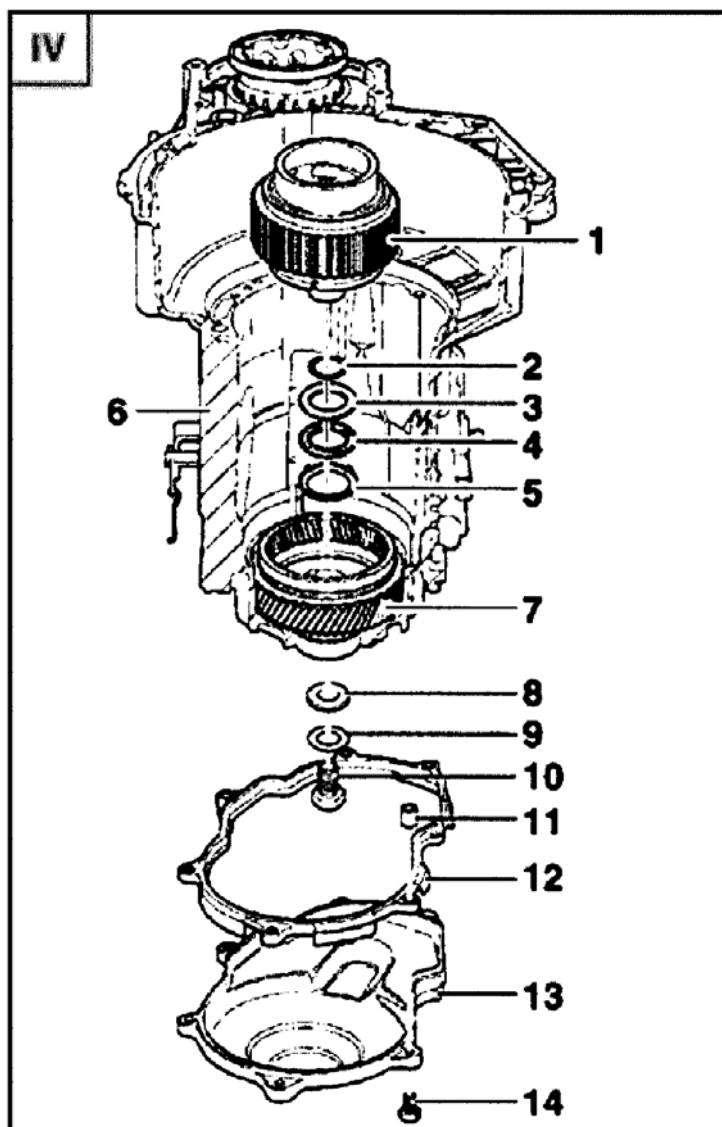
7 - Outer plate, -B1-

8 - Shim

9 - Transmission housing with planet carrier installed

Fig. 48: Removing & Installing Freewheel & Reverse Gear Brake
Courtesy of VOLKSWAGEN UNITED STATES, INC.

PLANET CARRIER AND TRANSMISSION HOUSING WITH INPUT GEAR AND COVER



IV - Planet carrier and transmission housing with input gear and cover

1 - Planet carrier

2 - O-ring

◆ Always replace

◆ Insert in planet carrier

3 - Axial needle bearing washer

4 - Axial needle bearing

5 - Axial needle bearing washer

◆ Install smooth side in input gear

6 - Transmission housing with input gear installed

7 - Input gear

◆ Do not remove to disassemble planetary transmission

8 - Planet carrier shim

9 - Washer

10 - Bolt, 30 Nm

◆ For small input shaft

11 - Spacer bushing

◆ Clip qty. 7 into gasket

12 - Gasket

◆ Always replace

13 - Cover

14 - Bolt, 8 Nm

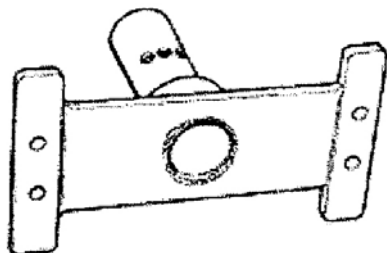
Fig. 49: Exploded View Of Planet Carrier & Transmission Housing
Courtesy of VOLKSWAGEN UNITED STATES, INC.

TRANSMISSION DISASSEMBLING AND ASSEMBLING

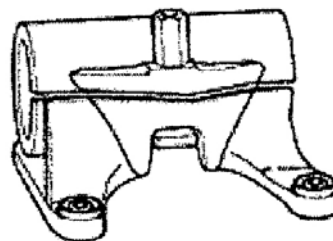
Special Tools And Equipment

- VW 309 Holding plate
- VW 313 Support clamp
- VW 353 Transmission support
- VW 402 Thrust plate
- VW 412 Press tool
- VW 415 A Tube
- VW 418 A Tube
- 3110 Tube
- 3267 Assembly ring
- 3336 Transmission lifting beam
- VAG 1331 Torque wrench

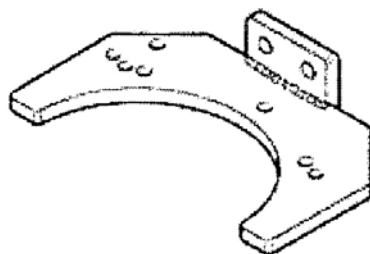
VW 309



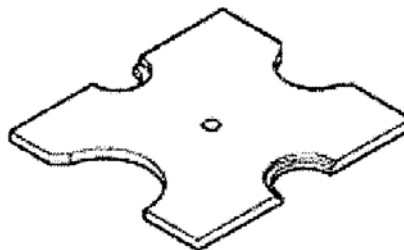
VW 313



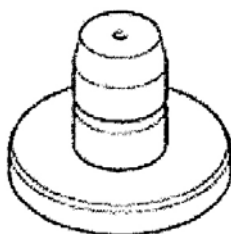
VW 353



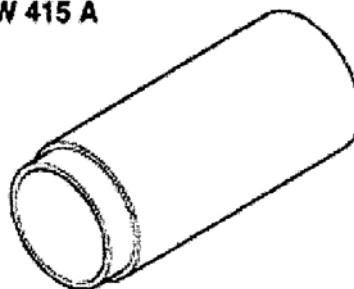
VW 402



VW 412



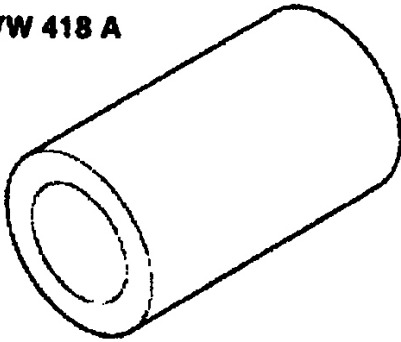
VW 415 A



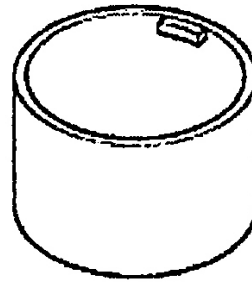
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Fig. 50: Identifying Assembly & Disassembly Special Tools (1 Of 2)
Courtesy of VOLKSWAGEN UNITED STATES, INC.

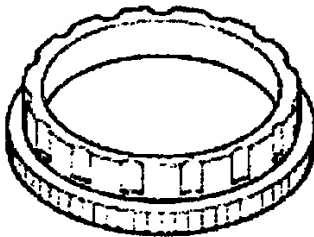
VW 418 A



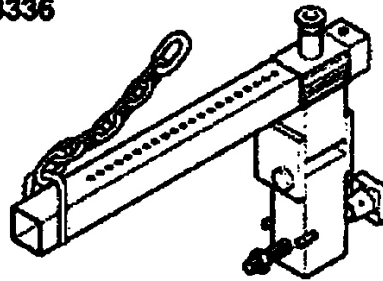
3110



3267



3336



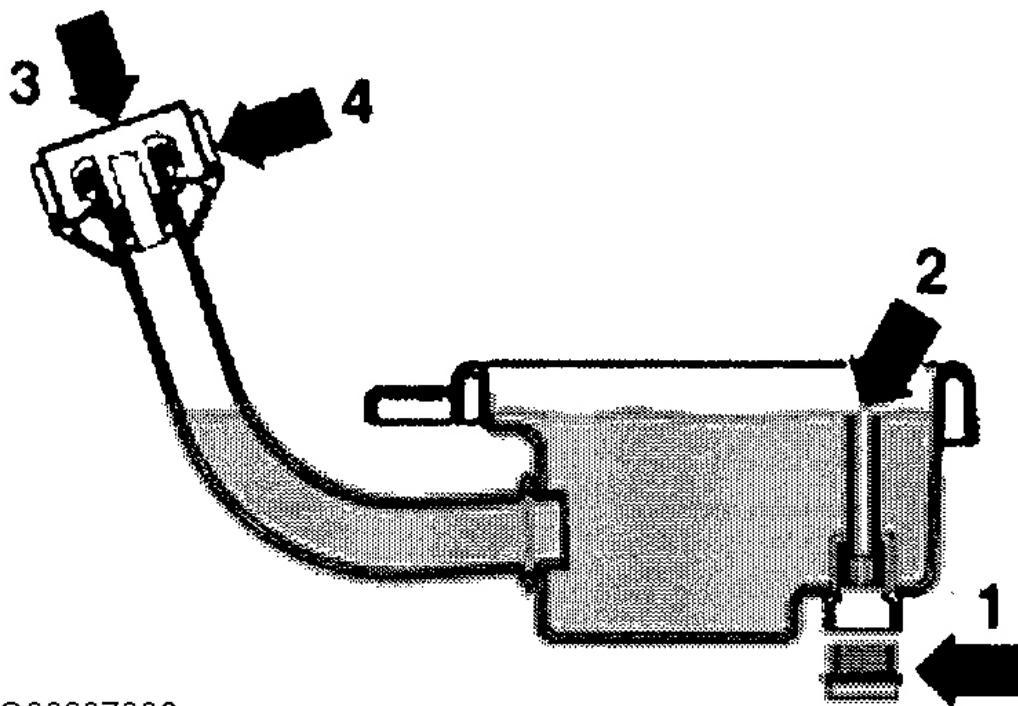
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Fig. 51: Identifying Assembly & Disassembly Special Tools (2 Of 2)
Courtesy of VOLKSWAGEN UNITED STATES, INC.

Disassembling Transmission

Ensure transmission is attached to transmission support device. See **Fig. 51** . Place container under transmission.

Remove sealing plug -1- and ATF overflow pipe -2-. See **Fig. 52** . Drain ATF.

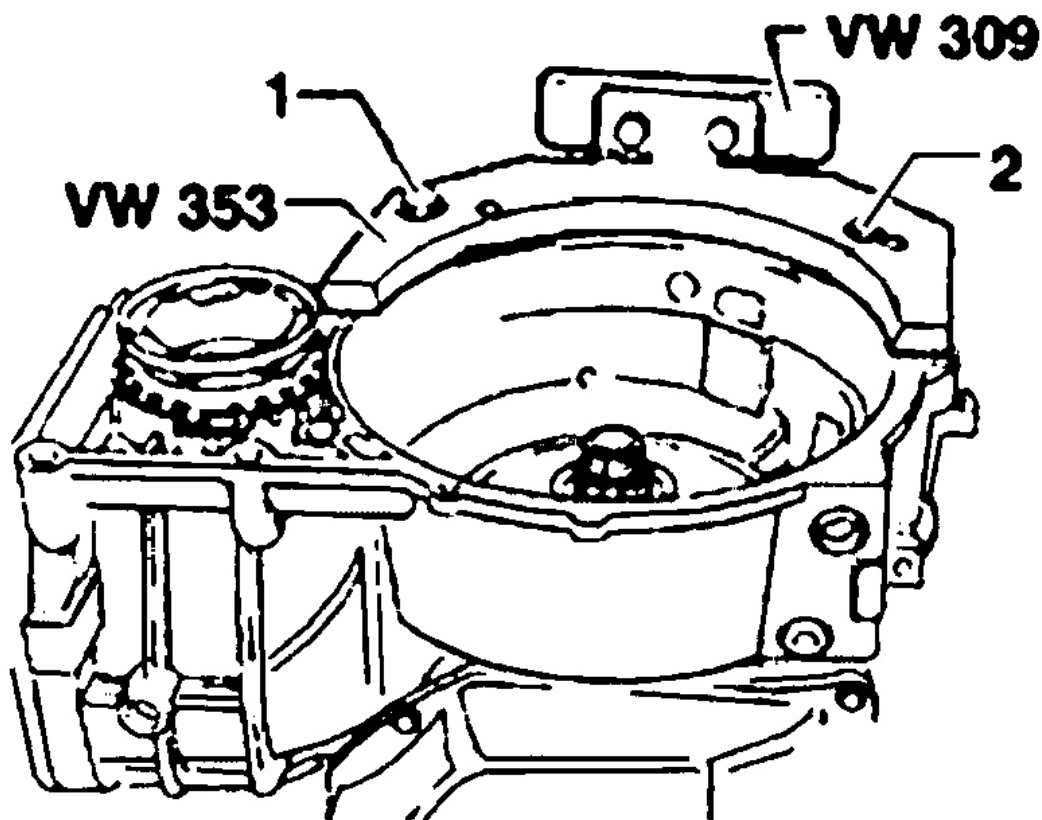


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Fig. 52: Identifying ATF Pipe & Plugs
Courtesy of VOLKSWAGEN UNITED STATES, INC.

Seal ATF cooler connections. Remove torque converter.

Secure transmission to assembly support with bolts -1- and -2- (M10). See **Fig. 53** . Remove transmission support device 3336.



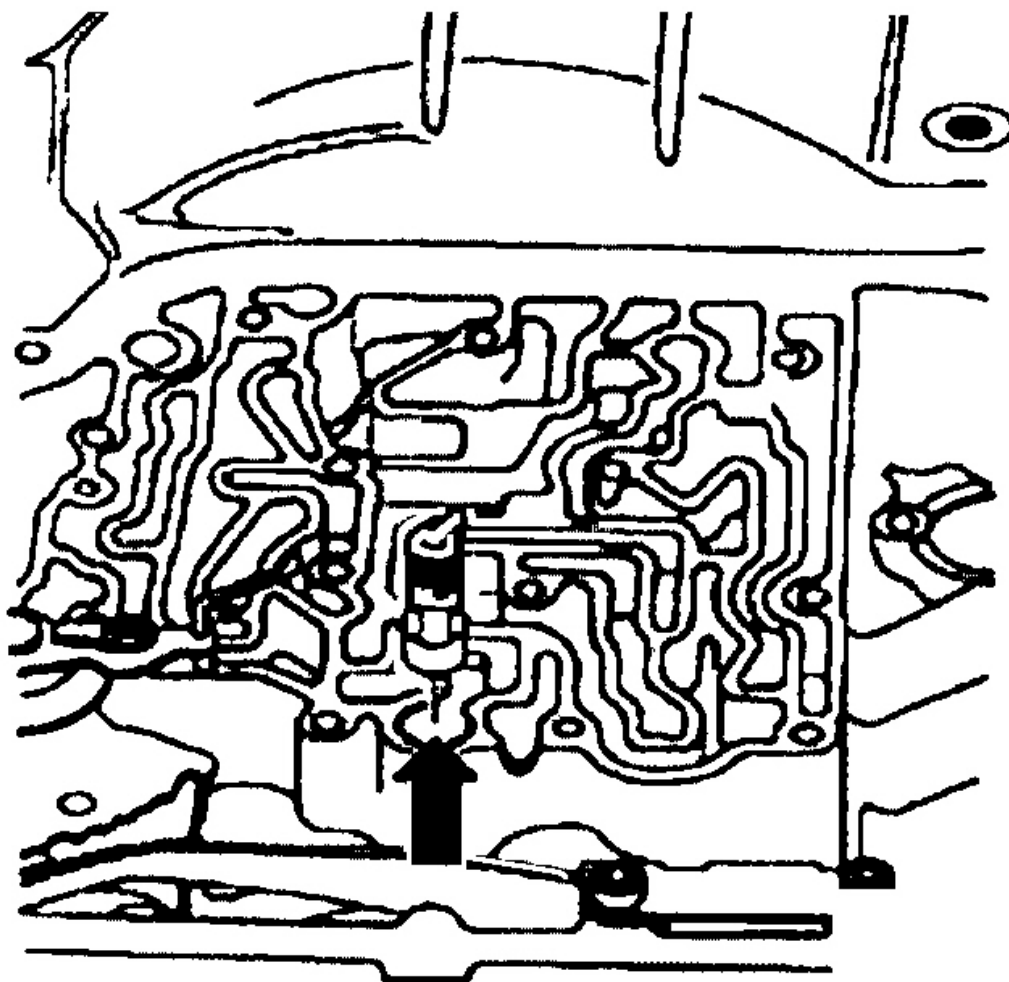
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Fig. 53: Identifying Transmission Assembly Support
Courtesy of VOLKSWAGEN UNITED STATES, INC.

Remove transmission housing cover with gasket (arrow). See **Fig. 85** . Remove transmission oil pan. Remove ATF screen.

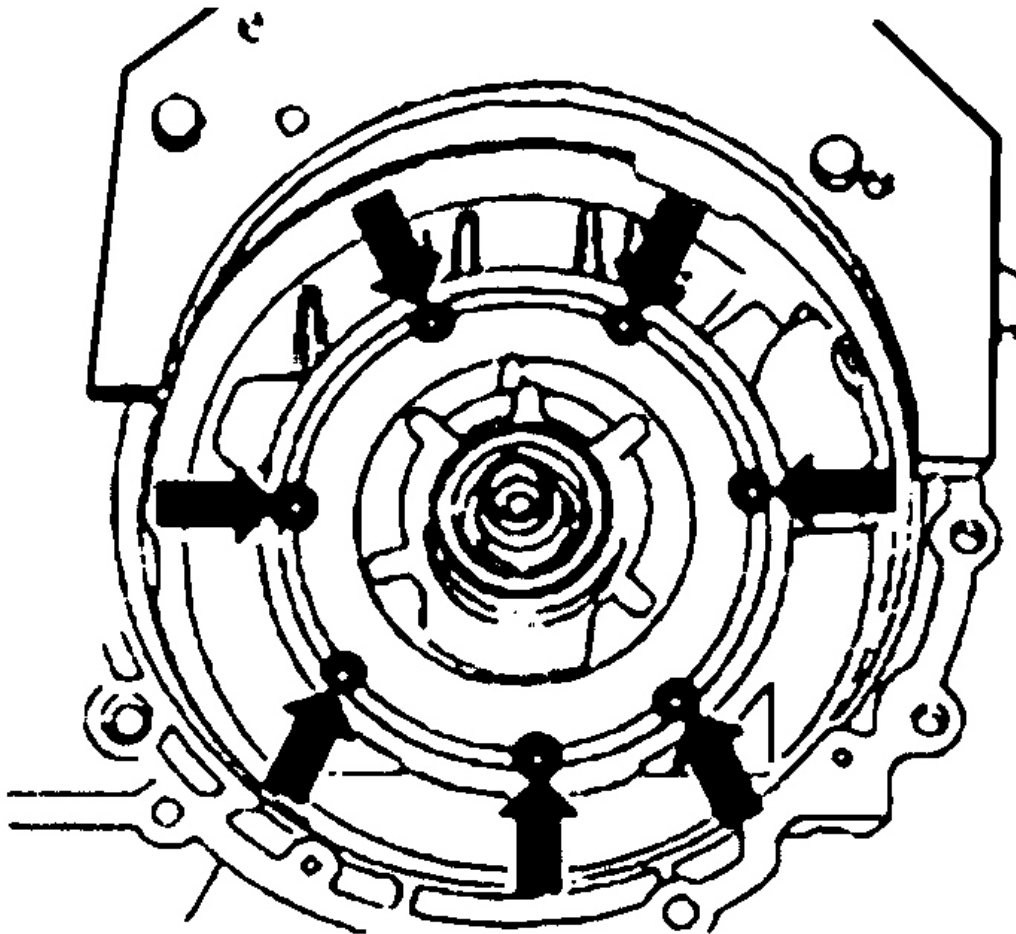
Remove valve body with conductor strip. See **VALVE BODY, REMOVING AND INSTALLING** under COMPONENT DISASSEMBLY & REASSEMBLY.

Pull out sealing plugs for -B1- (arrow). See **Fig. 54** . Remove ATF pump bolts (arrows). See **Fig. 55** .



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Fig. 54: Locating Sealing Plugs (B1)
Courtesy of VOLKSWAGEN UNITED STATES, INC.

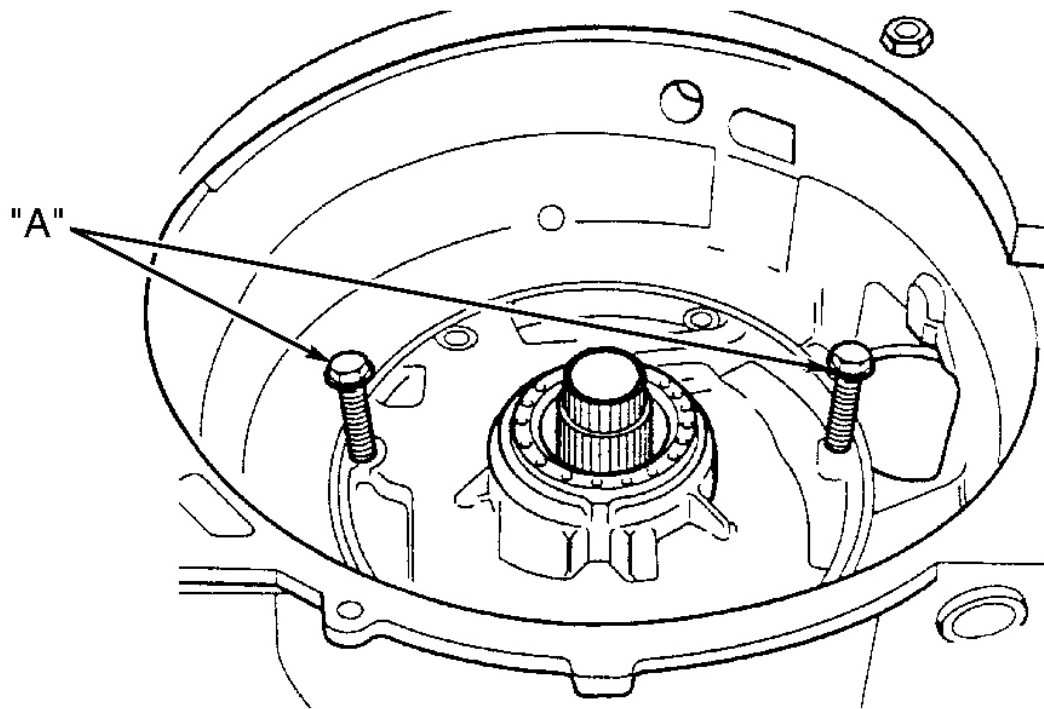


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Fig. 55: Locating ATF Pump Bolts

Courtesy of VOLKSWAGEN UNITED STATES, INC.

Screw bolts -A- (M8) into tapped holes of ATF pump. See **Fig. 56** . Press ATF pump off transmission by turning bolts -A- evenly.

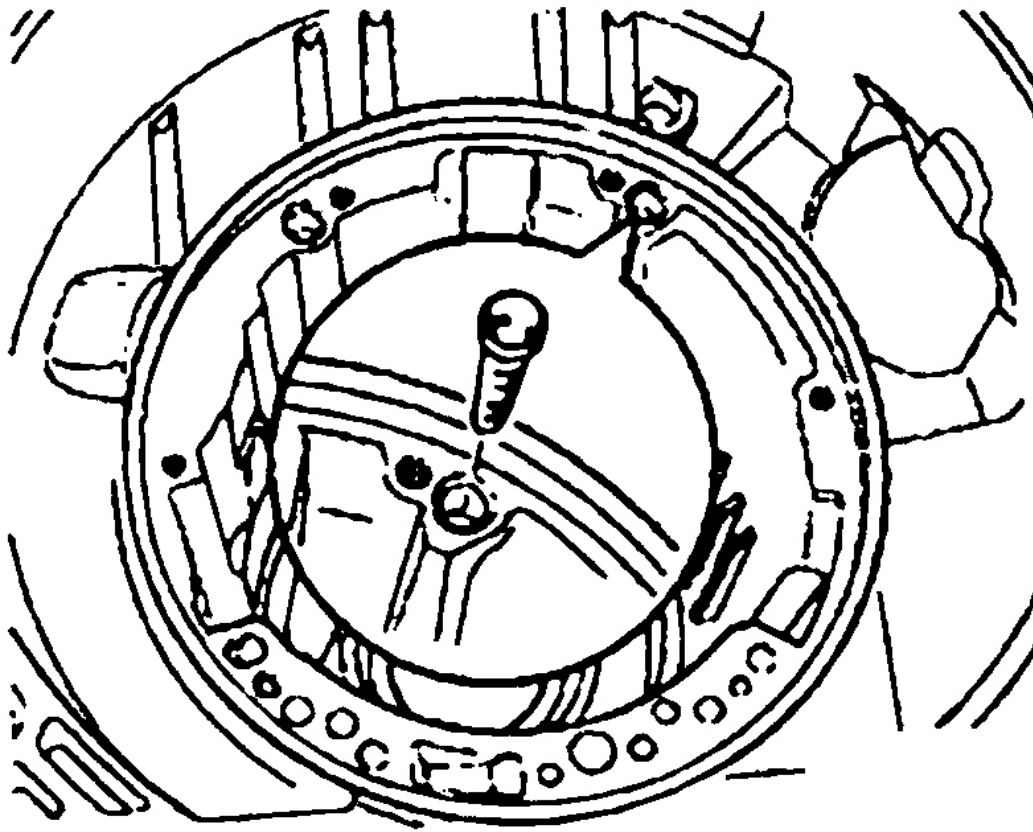


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Fig. 56: Removing Oil Pump

Courtesy of VOLKSWAGEN UNITED STATES, INC.

Remove strainer if installed. See **Fig. 57** . The strainer is installed in ATF cooler line.

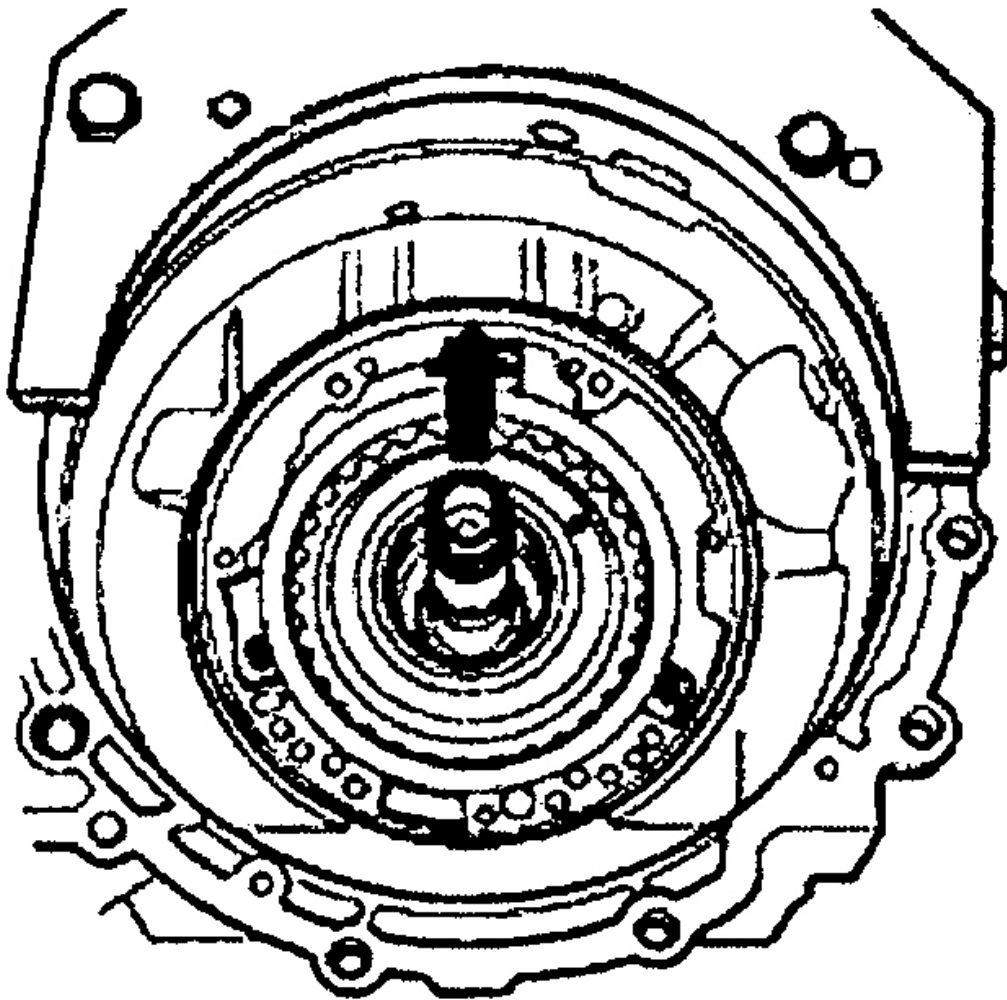


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Fig. 57: Removing Strainer

Courtesy of VOLKSWAGEN UNITED STATES, INC.

Remove all clutches with supporting tube, -B2- plates, springs and spring caps together. See **Fig. 58** . The clutches -K1- and -K3- are pressed together. Clutch -K1- must only be pressed off -K3- if one of the clutches is to be disassembled or replaced. See **Pressing Clutch -K1- Off -K3-** .



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Fig. 58: Removing Clutches W/ Supporting Tube
Courtesy of VOLKSWAGEN UNITED STATES, INC.

Insert screwdriver through hole of large sun gear to loosen and tighten bolt for small input shaft. See **Fig. 59**.

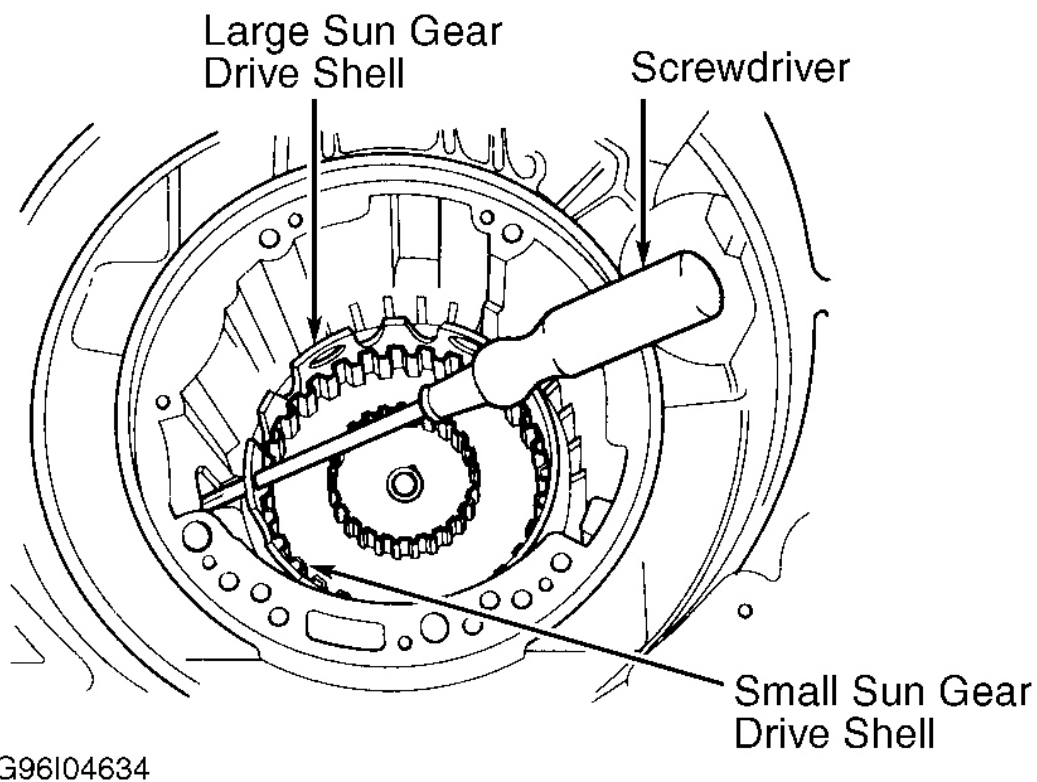
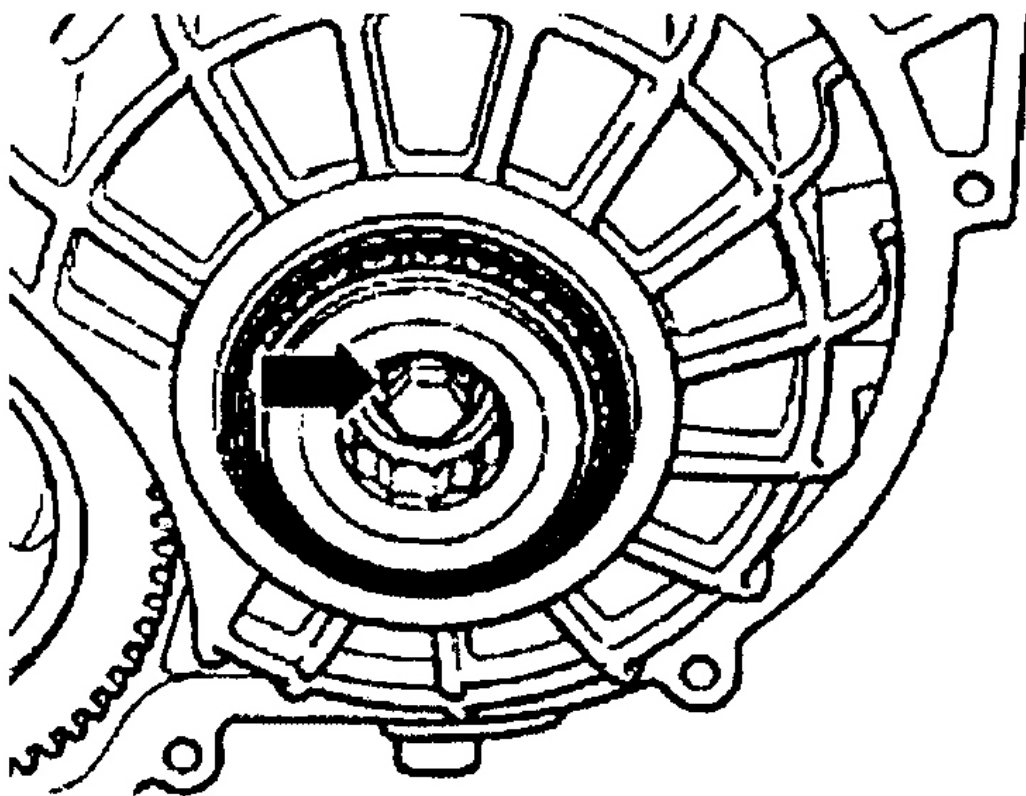


Fig. 59: Locking Small Sun Gear Drive Shell
Courtesy of VOLKSWAGEN UNITED STATES, INC.

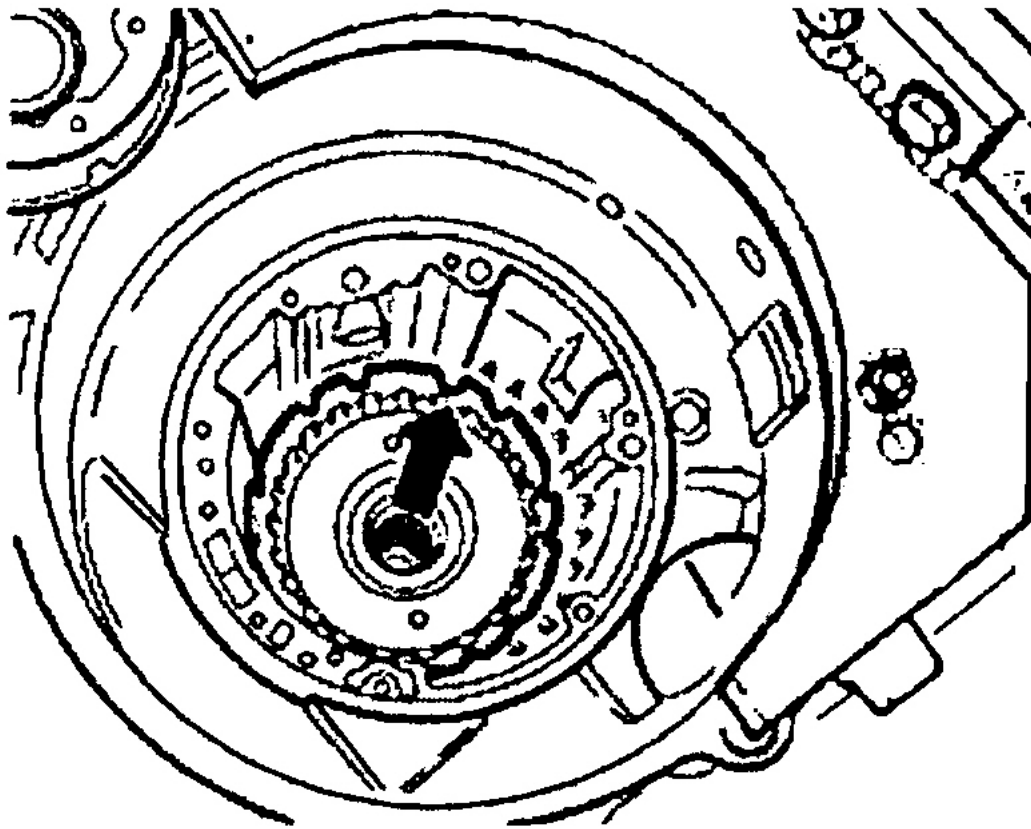
Loosen small input shaft bolt -arrow-. See **Fig. 60** . Remove small input shaft bolt, washer and shim. Planet carrier axial needle bearing remains in transmission/input gear. Remove small input shaft.



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Fig. 60: Locating Small Input Shaft Bolt
Courtesy of VOLKSWAGEN UNITED STATES, INC.

Remove large input shaft (arrow). See **Fig. 61** .

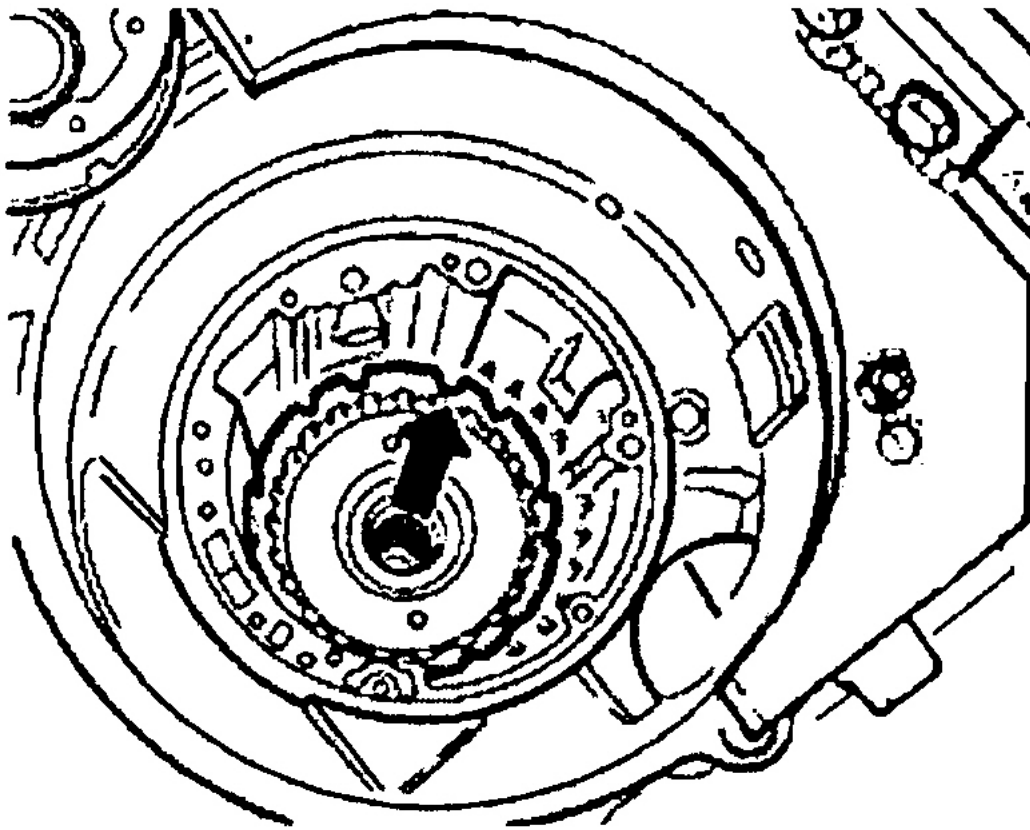


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Fig. 61: Removing Large Input Shaft

Courtesy of VOLKSWAGEN UNITED STATES, INC.

Remove large sun gear (arrow). See **Fig. 62** . Remove transmission vehicle speed sensor (VSS) -G38-. See **TRANSMISSION VEHICLE SPEED SENSOR -G38-** in DIAGNOSIS - 01M article.



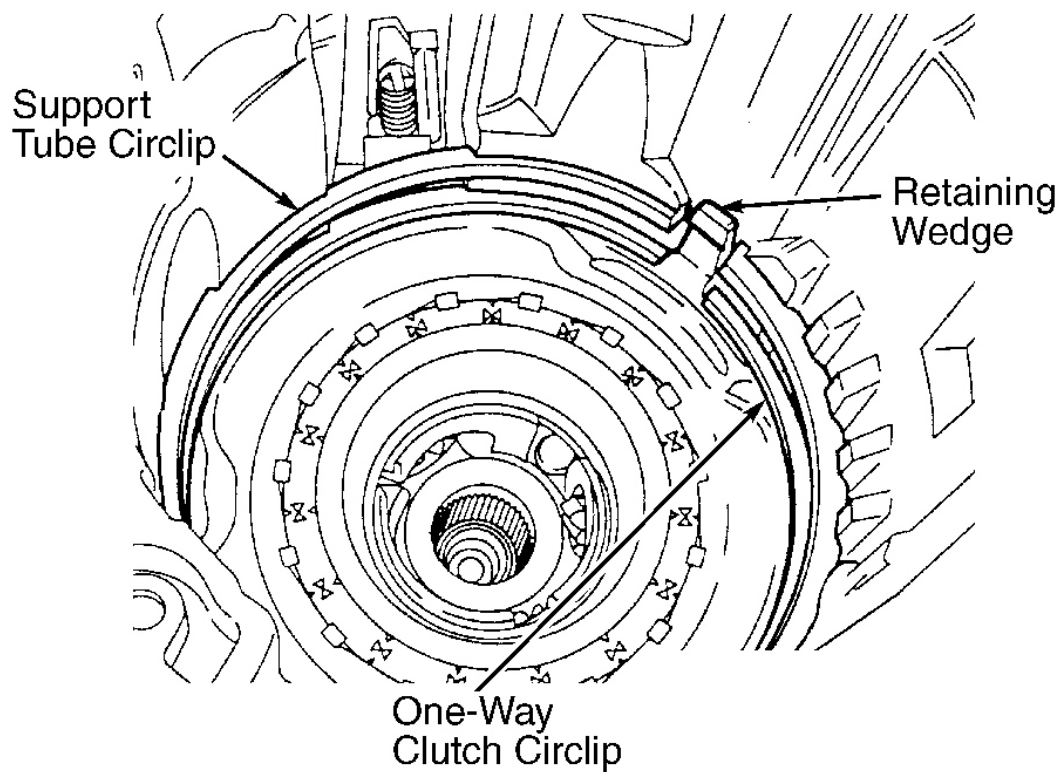
G00387895

Fig. 62: Removing Large Sun Gear

Courtesy of VOLKSWAGEN UNITED STATES, INC.

NOTE: Freewheel circlip is also referred to as "one way clutch clip".

Remove supporting tube circlip and freewheel circlip. See **Fig. 63** . Take freewheel out of transmission housing by pulling on freewheel retaining wedge with pliers.

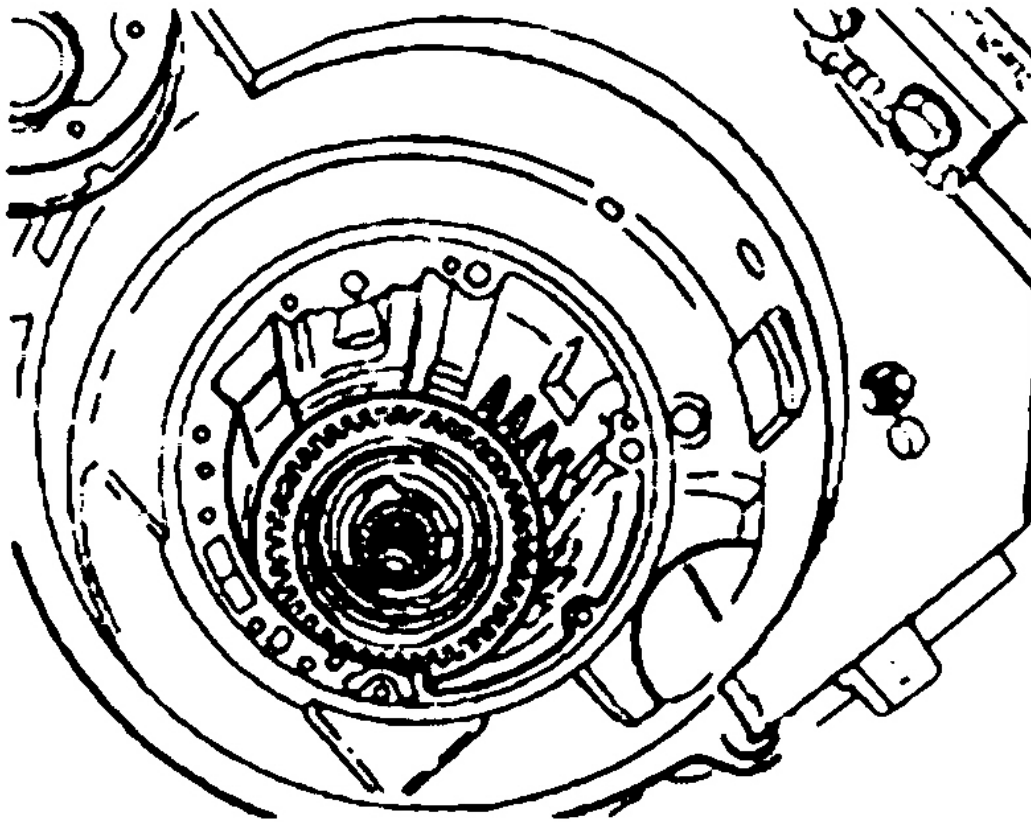


G99A05682

Fig. 63: Removing Support Tube & One-Way Clutch Circlips & One-Way Clutch
Courtesy of VOLKSWAGEN UNITED STATES, INC.

NOTE: It is not necessary to remove input gear to disassemble planetary transmission.

Remove planet carrier with dished spring. See **Fig. 64** . Remove reverse gear brake -B1- plates.



G00387896

Fig. 64: Removing Planet Carrier

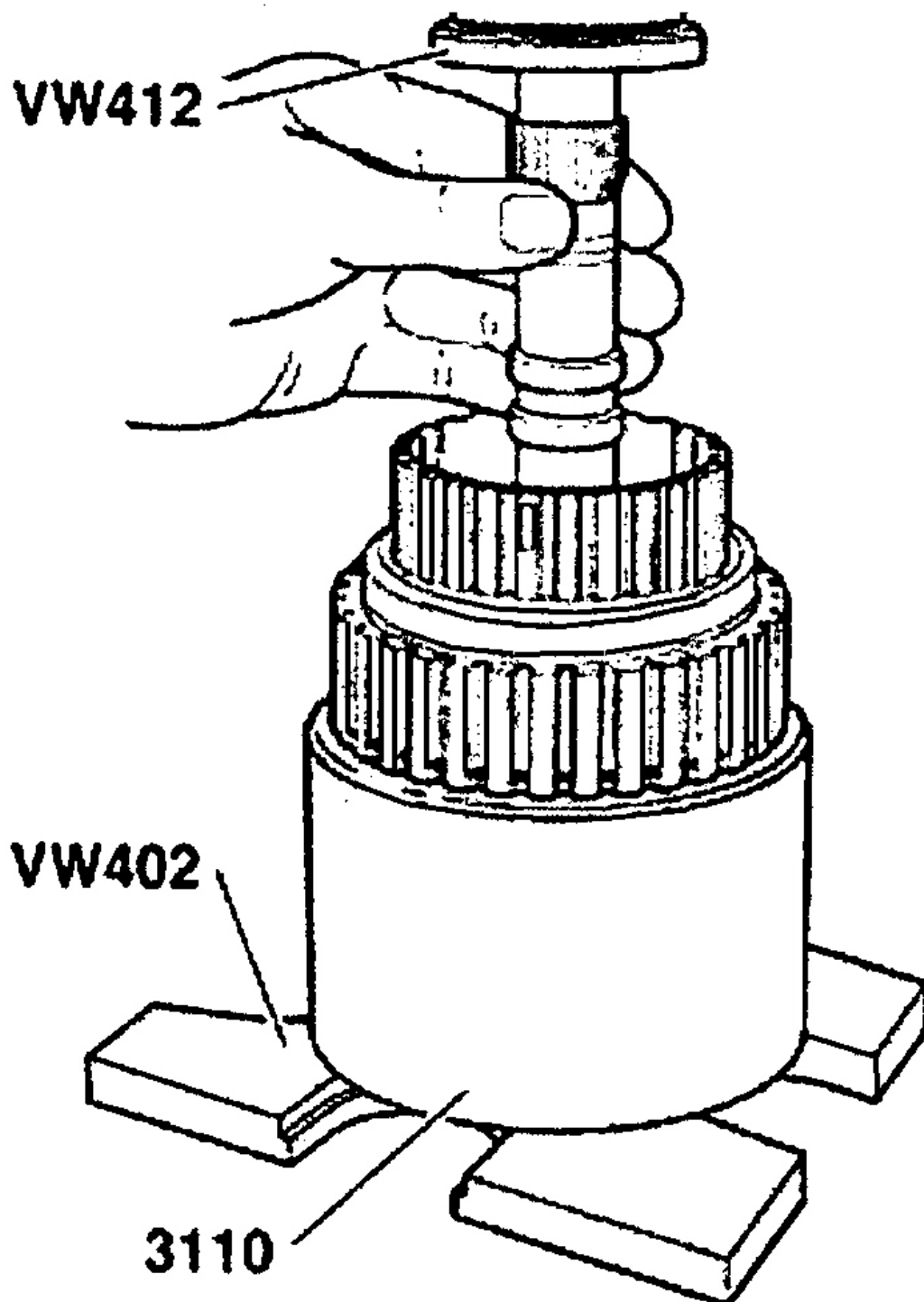
Courtesy of VOLKSWAGEN UNITED STATES, INC.

Pressing Clutch -K1- Off -K3-

The clutches -K1- and -K3- are pressed together.

Clutch -K1- must only be pressed off -K3- if one of the clutches is to be disassembled or replaced.

Make sure tool press surface is flat and not damaged. The pin of tube 3110 faces to plate VW 402. Hold turbine shaft when pressing off. See **Fig. 65** .

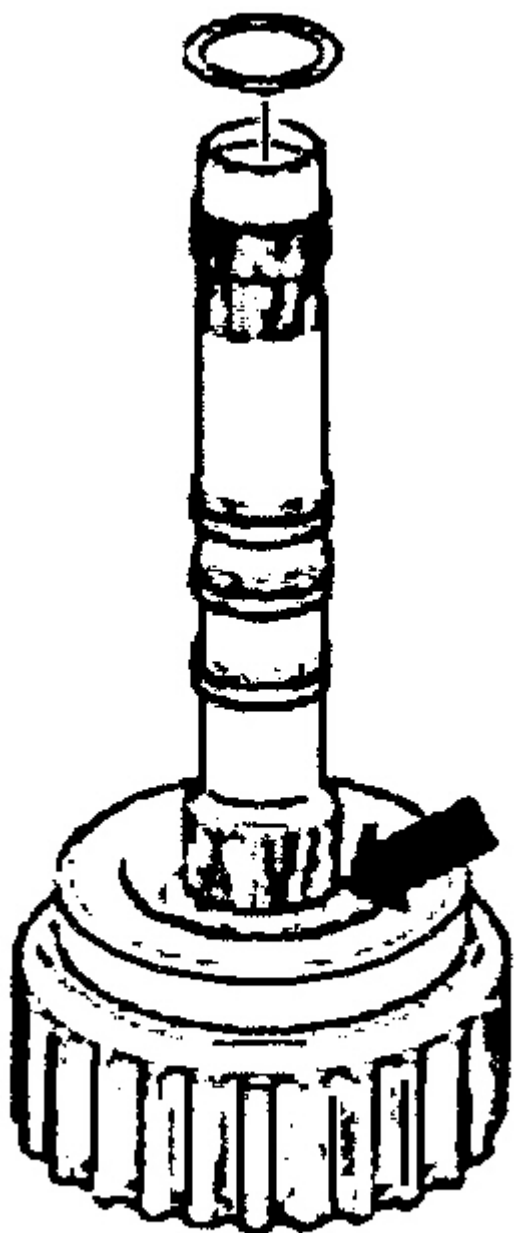


G00387891

Fig. 65: Pressing Clutch -K1- Off -K3-
Courtesy of VOLKSWAGEN UNITED STATES, INC.

Pressing Clutch -K1- Onto -K3-

Insert new O-ring in recess turbine shaft (arrow). See **Fig. 66** .

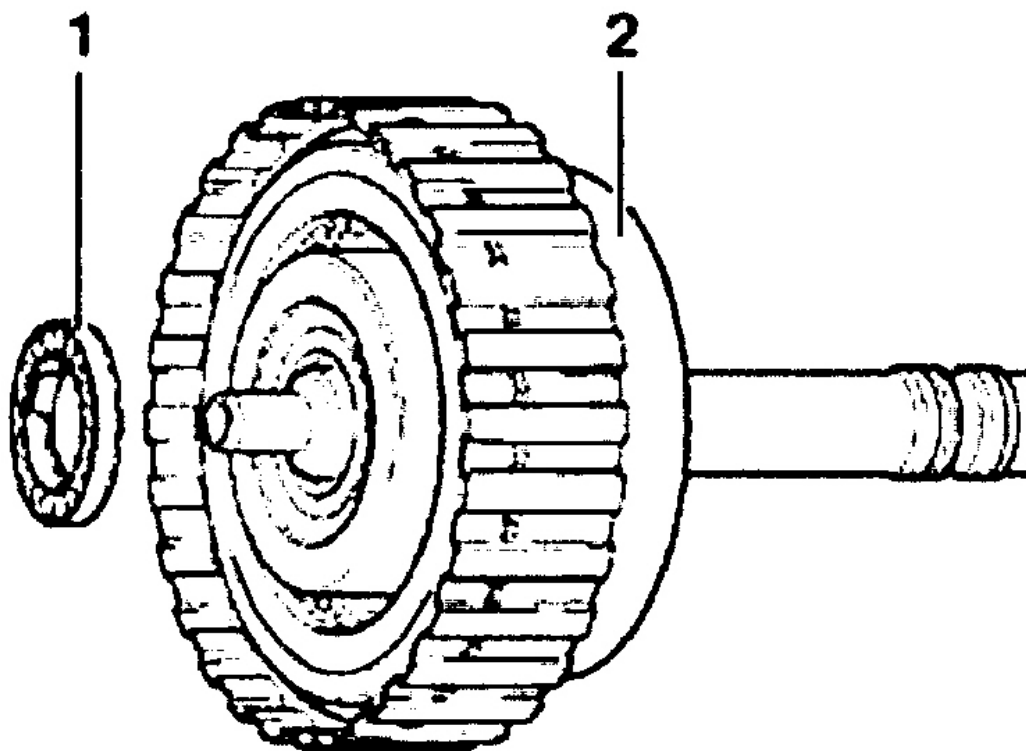


G00387922

Fig. 66: Locating Turbine Shaft "O" Ring
Courtesy of VOLKSWAGEN UNITED STATES, INC.

Moisten O-ring with ATF.

Clip (2) axial needle bearing (1) with washer to 3rd and 4th gear clutch -K3-. See **Fig. 67** .

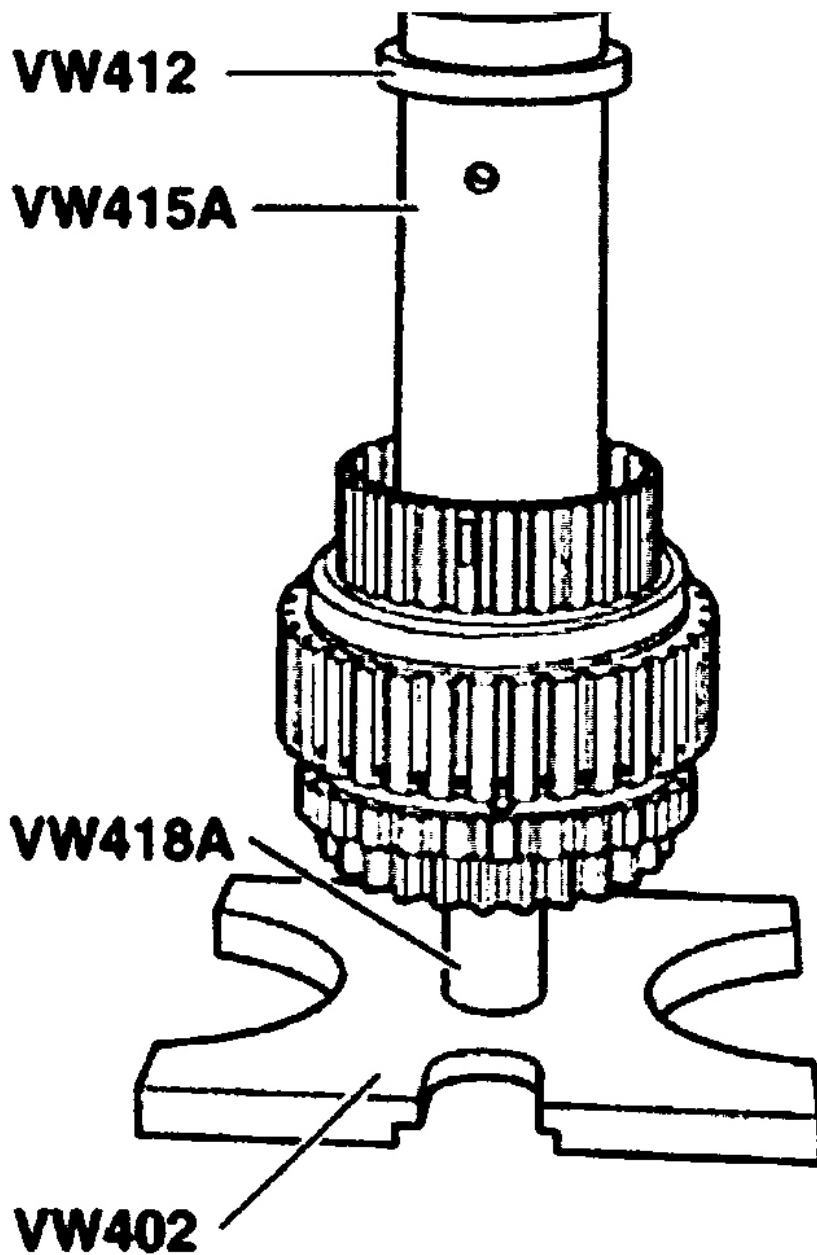


G00387923

Fig. 67: Identifying Axial Needle Bearing & Washer
Courtesy of VOLKSWAGEN UNITED STATES, INC.

Make sure tool press surface is flat and not damaged.

Prepare -K1- and -K3- for pressing as illustrated. See **Fig. 68** .

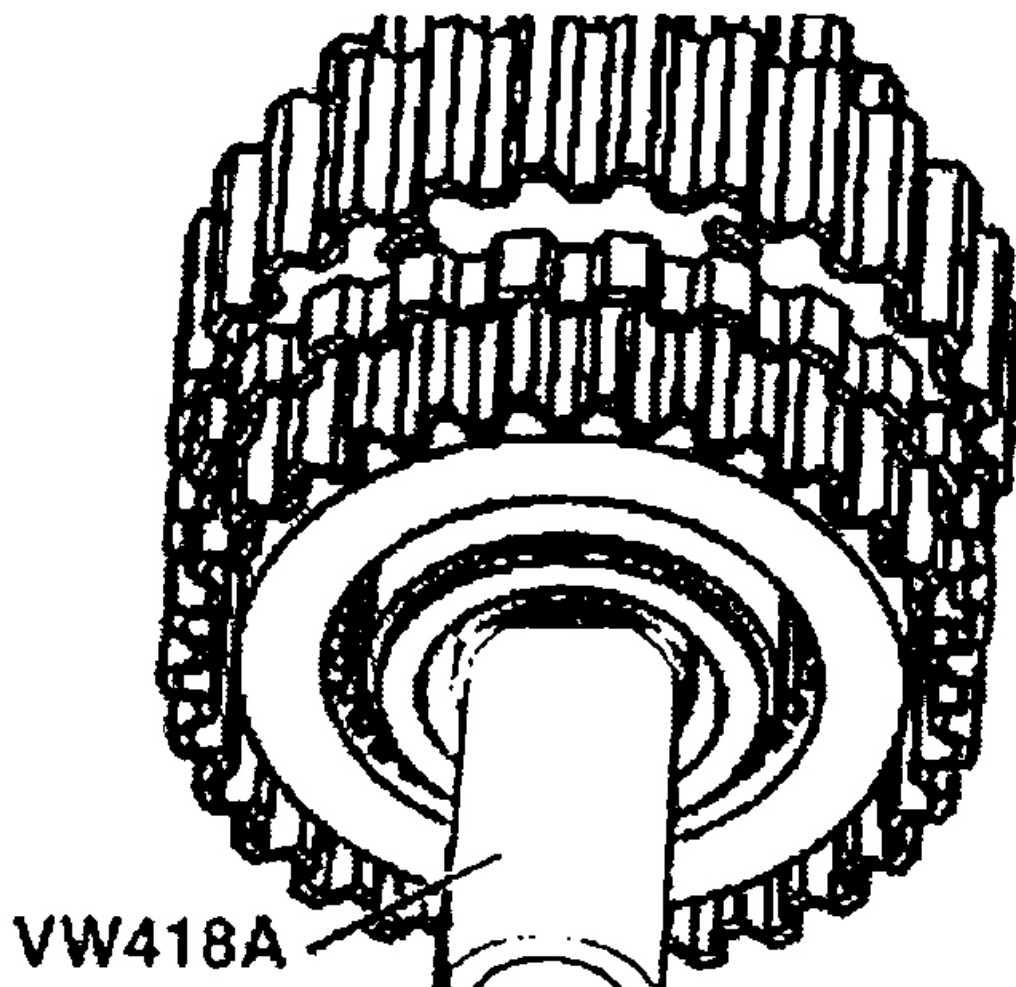


G00387924

Fig. 68: Preparing -K1- & -K3- For Pressing
Courtesy of VOLKSWAGEN UNITED STATES, INC.

Before pressing on, align VW 418 A centrally onto surface for axial needle bearing (this illustration shows -K3-

from below). See **Fig. 69** .



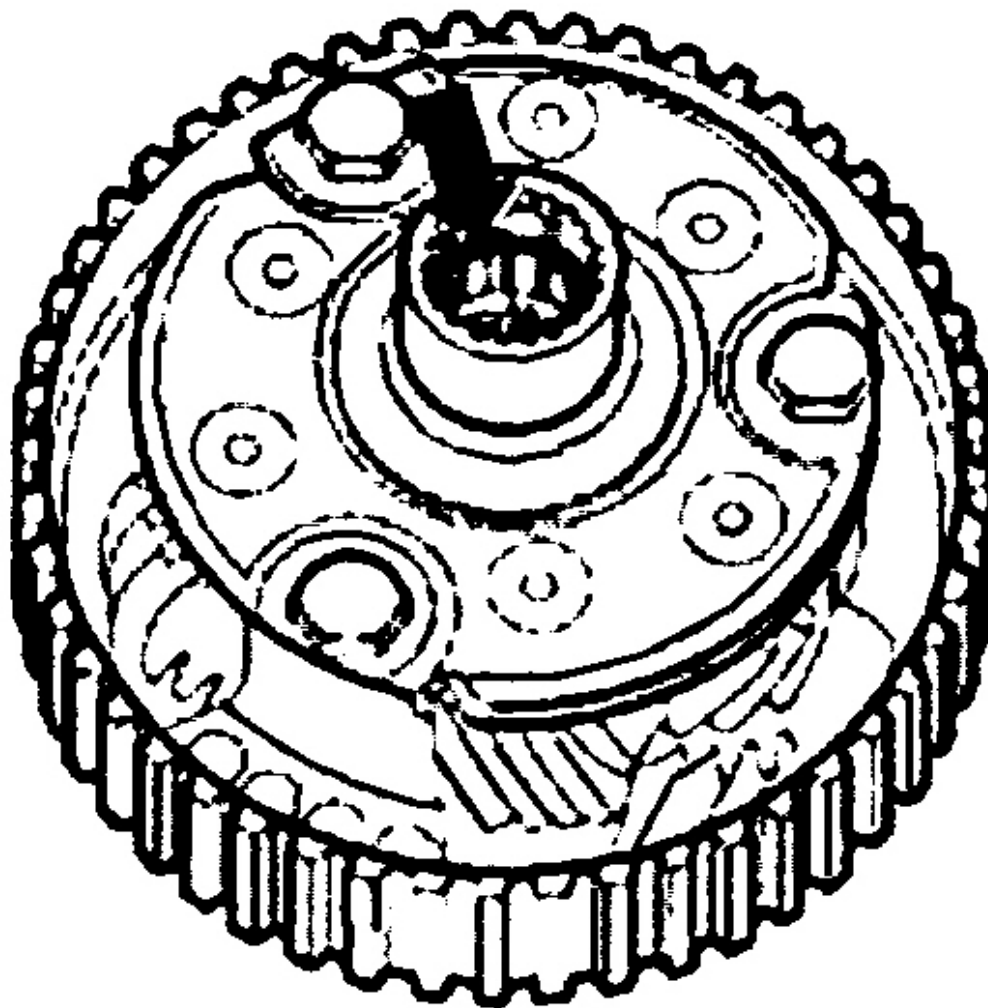
G00387925

Fig. 69: Aligning VW 418 A Onto Axial Bearing Surface
Courtesy of VOLKSWAGEN UNITED STATES, INC.

Press clutch -K1- on carefully until stop is perceptible.

NOTE: Do not exert further pressure onto clutches!

Install O-ring into planet carrier. See **Fig. 70** .



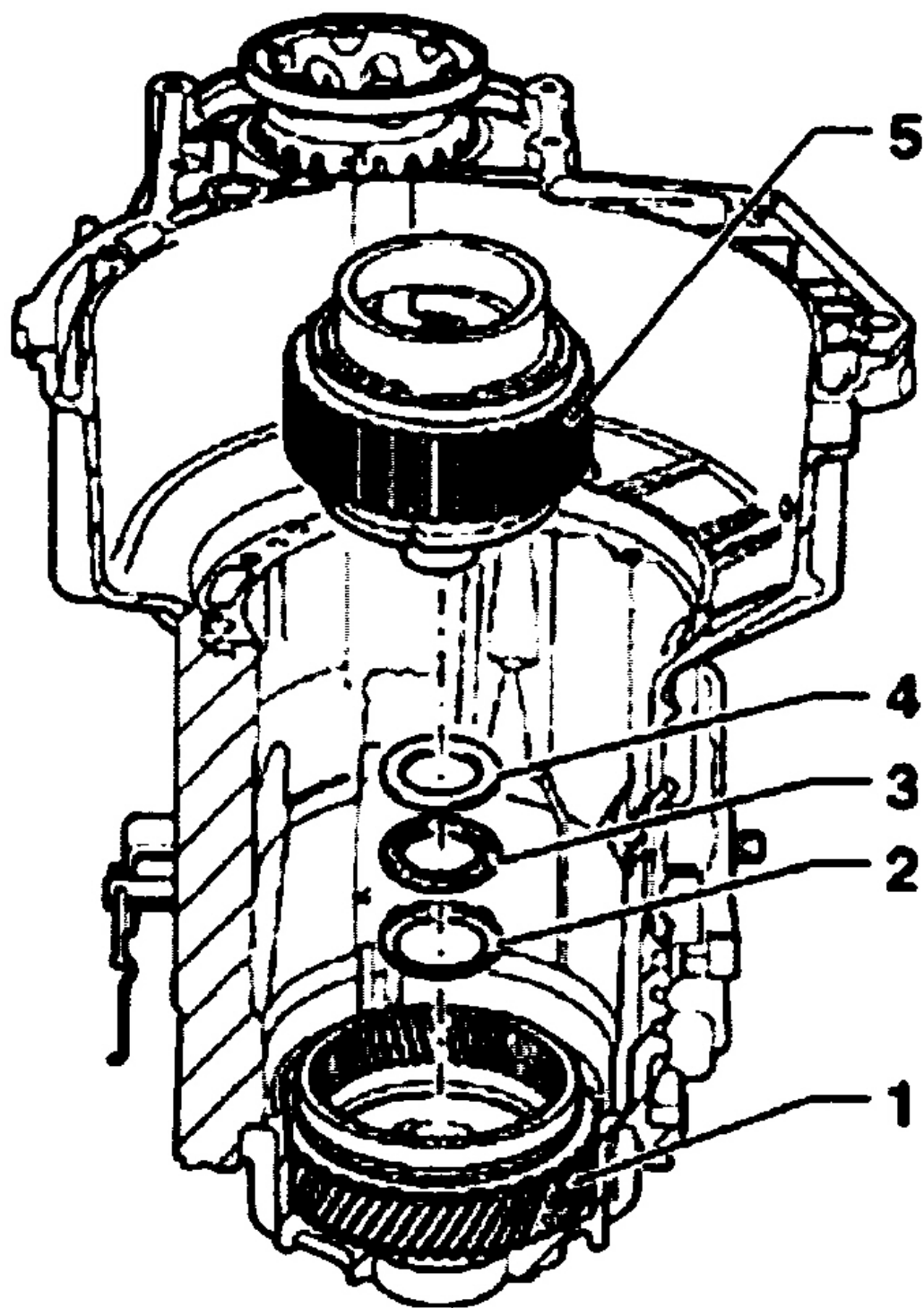
G00387926

Fig. 70: Locating Planet Carrier "O" Ring
Courtesy of VOLKSWAGEN UNITED STATES, INC.

NOTE: After replacing planet carrier. See **PLANET CARRIER, ADJUSTING** .

Insert axial needle bearing with washers and planet carrier in input gear. See **Assembling Transmission** .

- 1 - Input gear is installed in transmission housing. See **TRANSMISSION, DISASSEMBLING AND ASSEMBLING -OVERVIEW-** .
- 2 - Axial needle bearing washer, insert smooth side into input gear.
- 3 - Axial needle bearing.
- 4 - Axial needle bearing washer.
- 5 - Install planet carrier with seal installed.

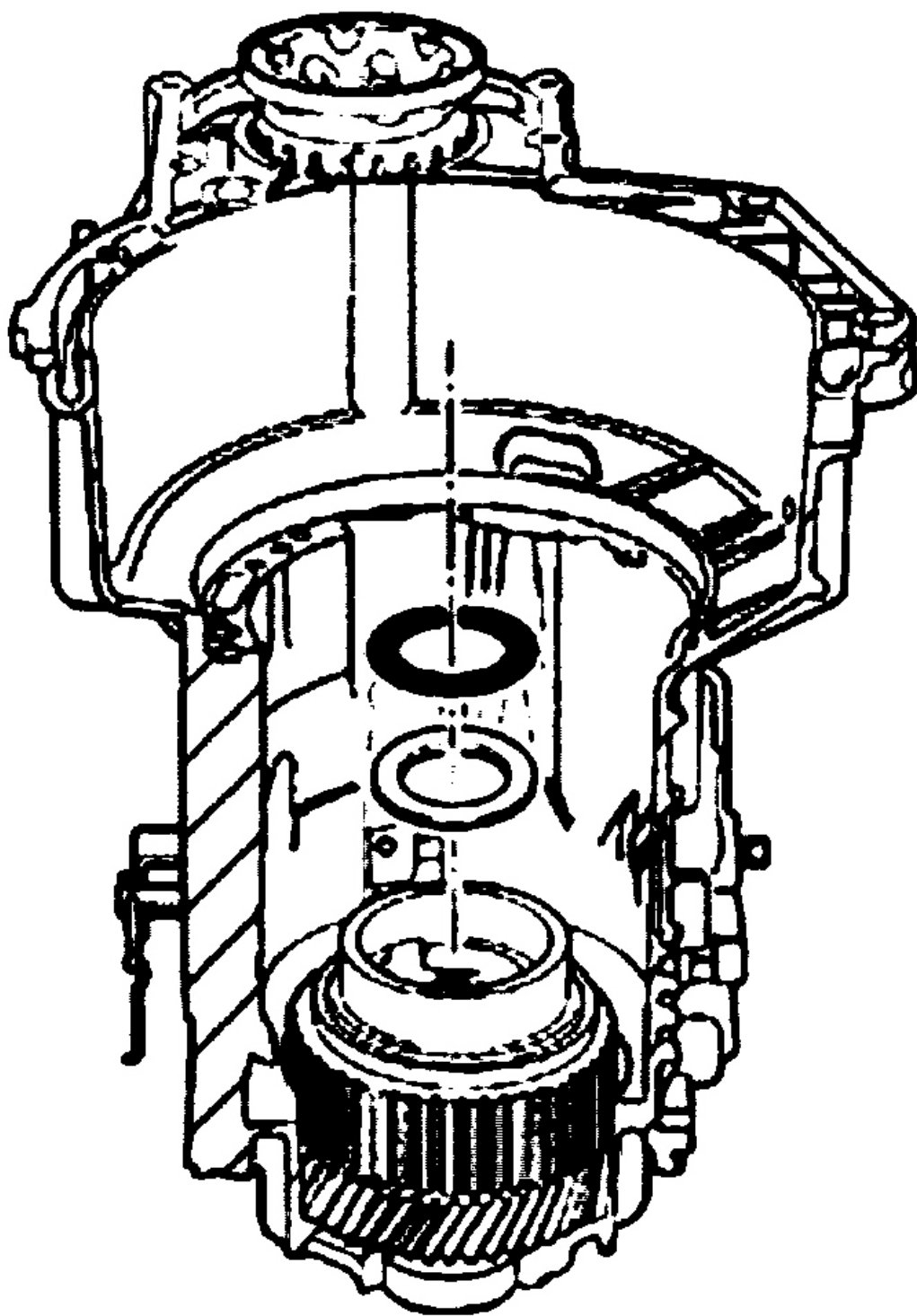


G00387927

Fig. 71: Installing Planet Carrier

Courtesy of VOLKSWAGEN UNITED STATES, INC.

Place washer and axial needle bearing on "small sun gear" in planet carrier. See **Fig. 72** .



G00387928

Fig. 72: Installing Washer & Axial Needle Bearing
Courtesy of VOLKSWAGEN UNITED STATES, INC.

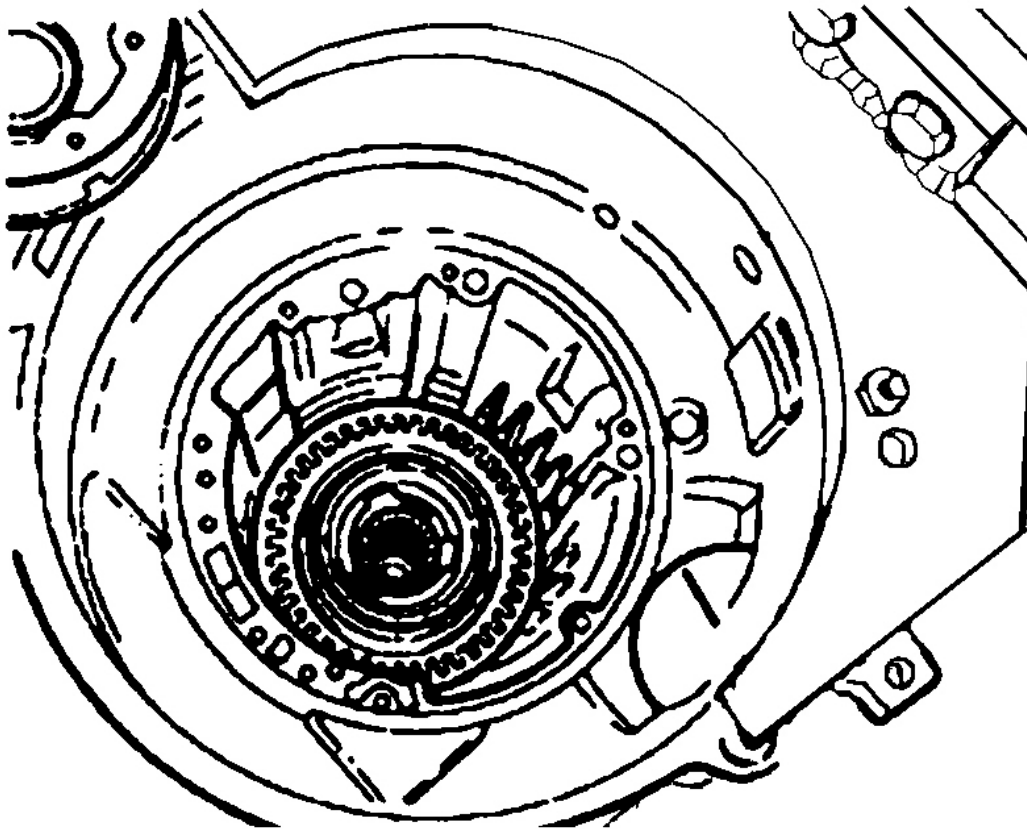
Centralize washer and axial needle bearing on small sun gear. See **Fig. 72** .

Insert inner and outer -B1- plates. See **Fig. 72** .

Insert pressure plate with flat side facing plates. See **Fig. 72** .

Thickness of pressure plate varies according to number of plates. Replacement part is assigned according to transmission code letters. See **Fig. 72** .

Insert dished washer with convex facing freewheel. See **Fig. 73** .

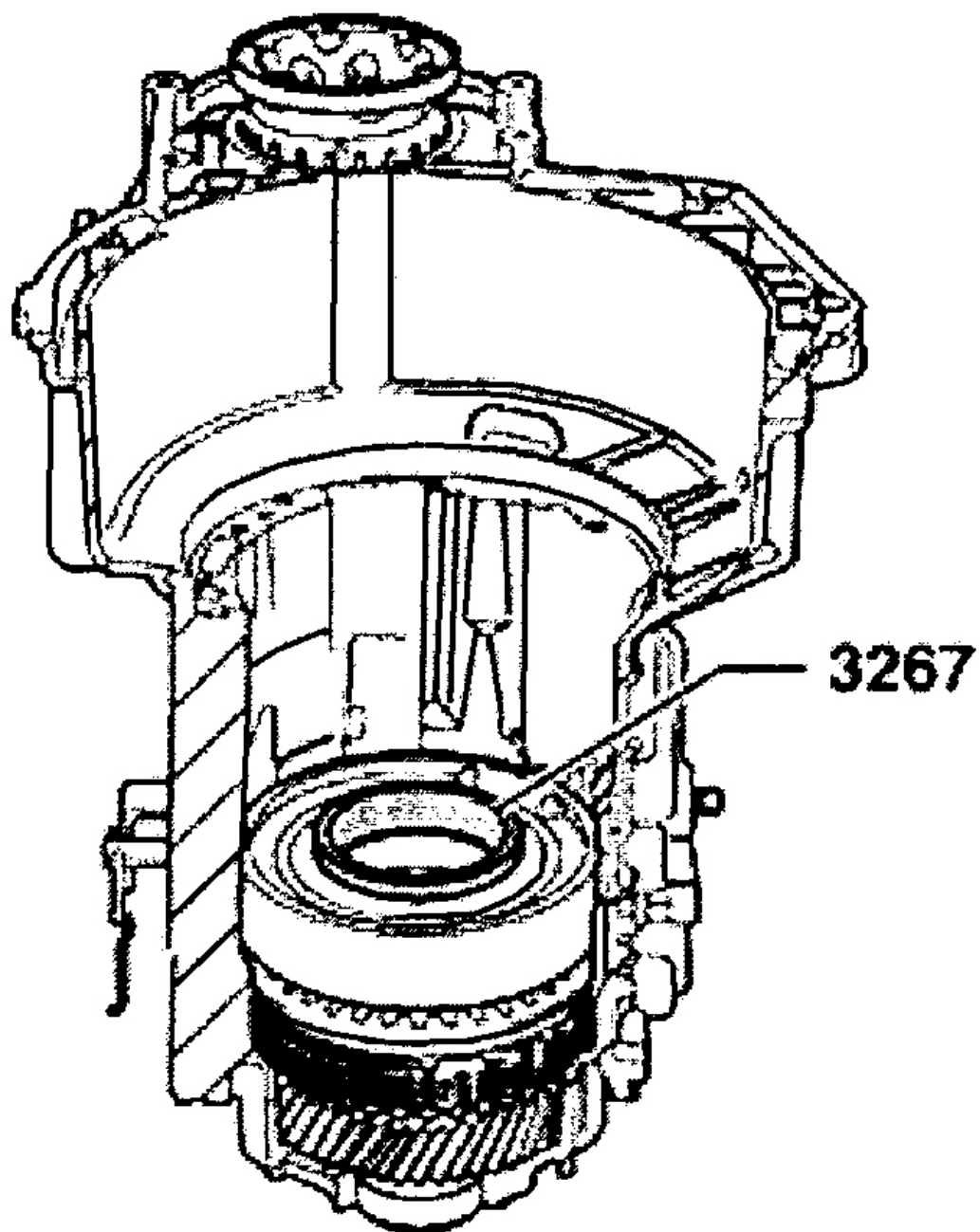


G00387929

Fig. 73: Installing Dished Washer
Courtesy of VOLKSWAGEN UNITED STATES, INC.

NOTE: When replacing: Transmission housing, freewheel, piston for reverse gear brake -B1- or plates, then adjust -B1-. See REVERSE GEAR BRAKE -B1-, ADJUSTING .

Preload freewheel rollers with assembly ring 3267 and insert free wheel. See **Fig. 74** .



G00387930

Fig. 74: Installing Freewheel Roller W/Assembly Ring
Courtesy of VOLKSWAGEN UNITED STATES, INC.

Install circlip for freewheel -b- and circlip for supporting tube -a-. See **Fig. 63** .

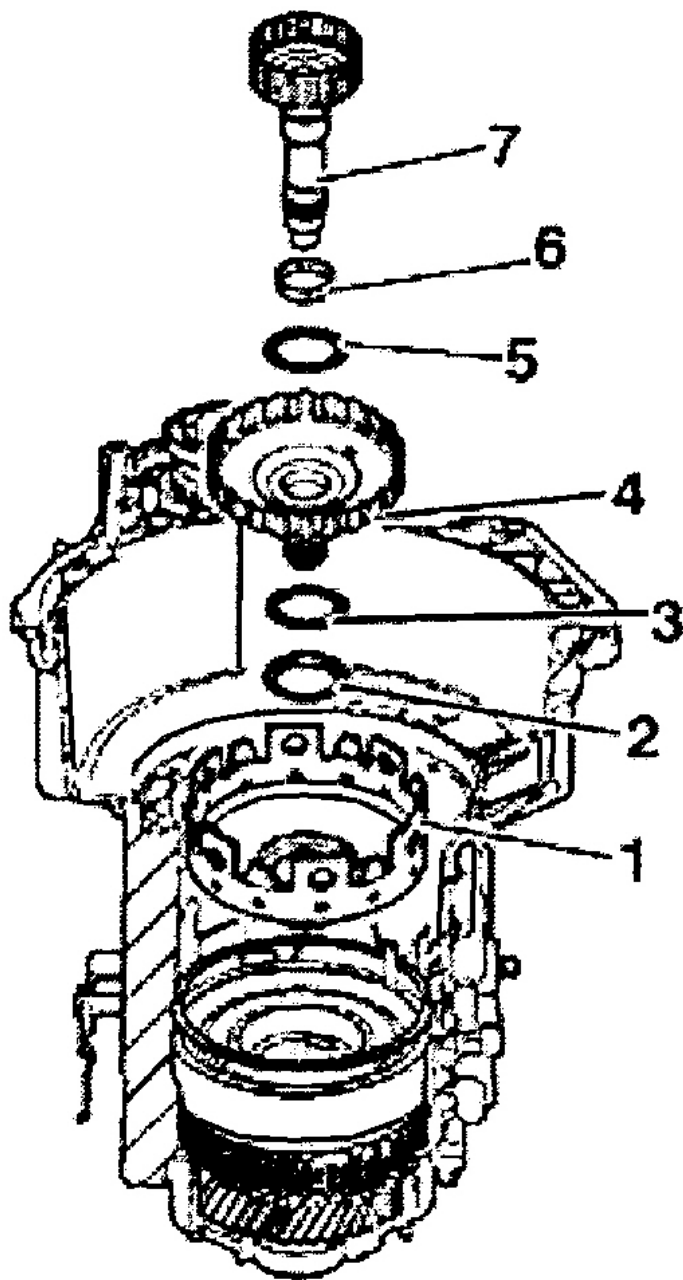
Insert circlip gaps over freewheel retaining wedge.

Install transmission vehicle speed sensor -G38-. See **TRANSMISSION VEHICLE SPEED SENSOR -G38-** in DIAGNOSIS - 01M article.

Perform measurement check of -B1-. See **REVERSE GEAR BRAKE -B1-, ADJUSTING** .

Insert components into transmission housing starting with large sun wheel down to small input shaft. See **Fig. 75** .

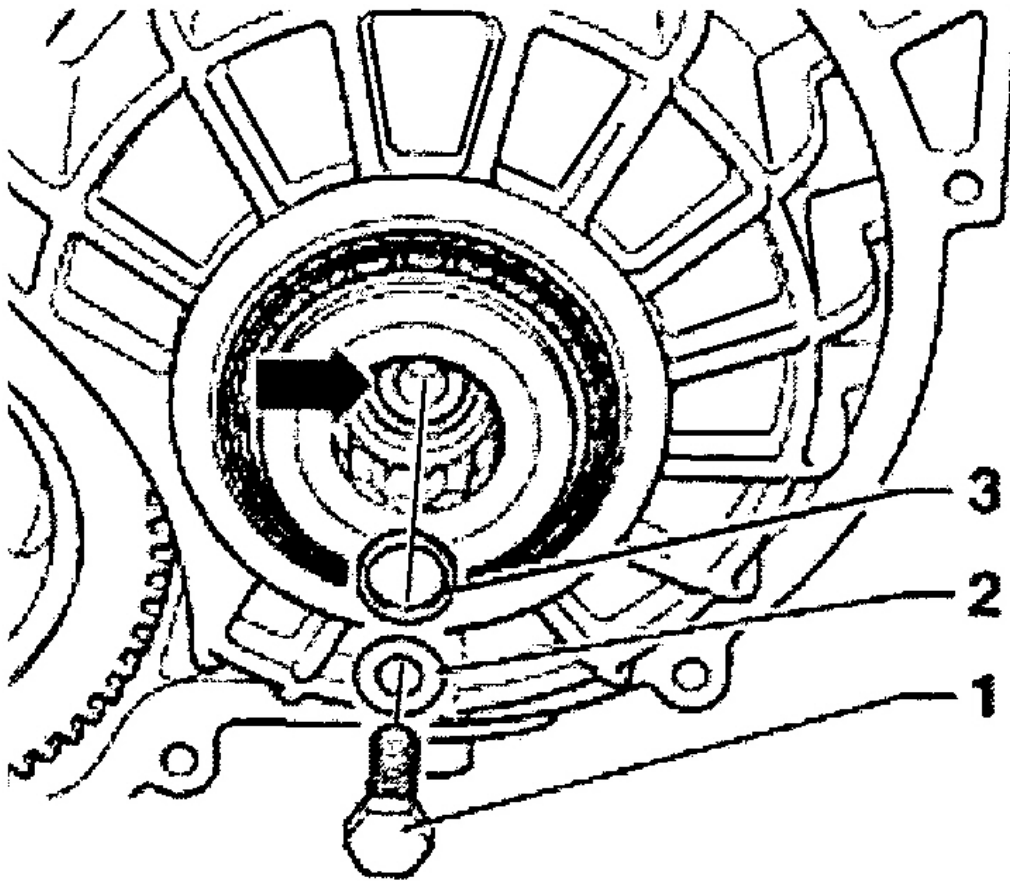
- 1 - Large sun wheel
- 2 - Needle bearing washer (collar faces large sun wheel)
- 3 - Axial needle bearing
- 4 - Large input shaft
- 5 - Axial needle bearing
- 6 - Needle bearing
- 7 - Small input shaft



G00387931

Fig. 75: Installing Components Into Transmission Housing
 Courtesy of VOLKSWAGEN UNITED STATES, INC.

Install small drive shaft bolt -1- with washer -2- and shim -3-. Tightening torque 30 Nm. See **Fig. 76**.



G00387932

Fig. 76: Installing Small Drive Shaft Bolt
 Courtesy of VOLKSWAGEN UNITED STATES, INC.

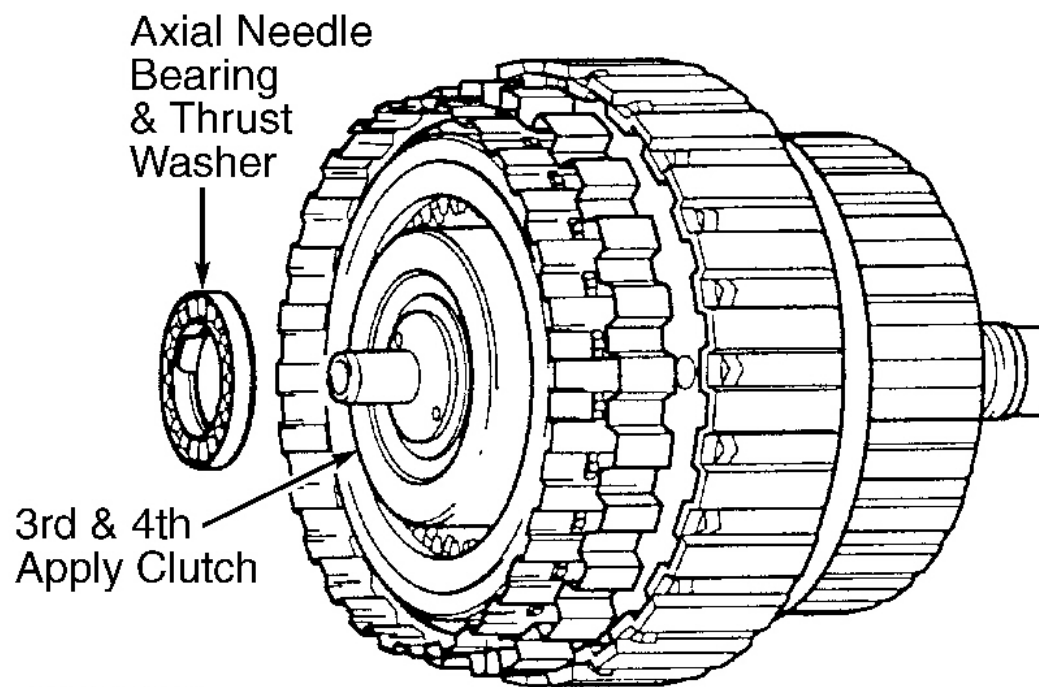
NOTE:

- Insert shim -3- onto small input shaft shoulder (arrow).
- Determining shim thickness, adjusting planet carrier. See PLANET CARRIER, ADJUSTING .

Perform planet carrier check measurement. See Planet Carrier Check Measurement .

Clip axial needle bearing with thrust washer to 3rd and 4th gear clutch -K3-. See Fig. 77 .

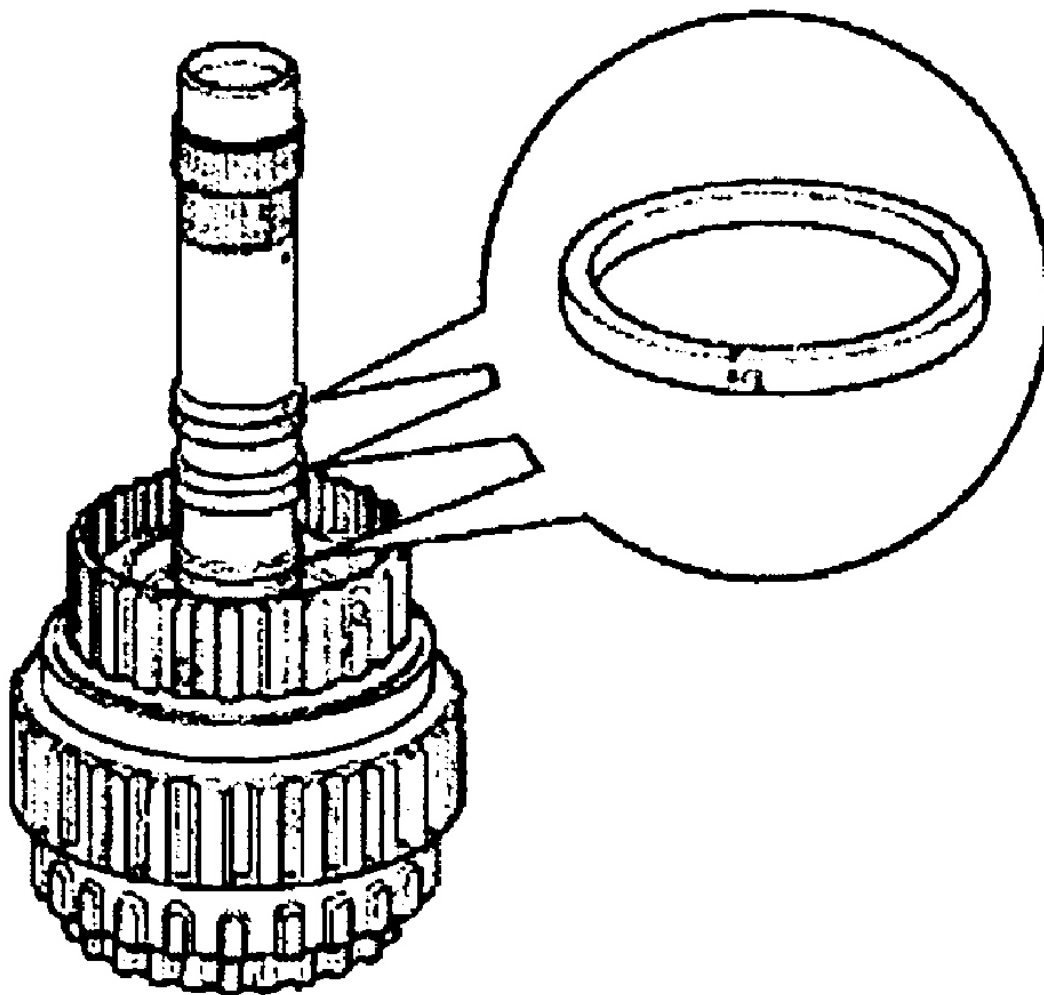
- 1 - Axial needle bearing with thrust washer
- 2 - 3rd and 4th gear clutch -K3-



G99A05696

Fig. 77: Installing Axial Needle Bearing With Thrust Washer
Courtesy of VOLKSWAGEN OF AMERICA, INC.

Make sure piston rings seat correctly on -K3-. See **Fig. 78** .

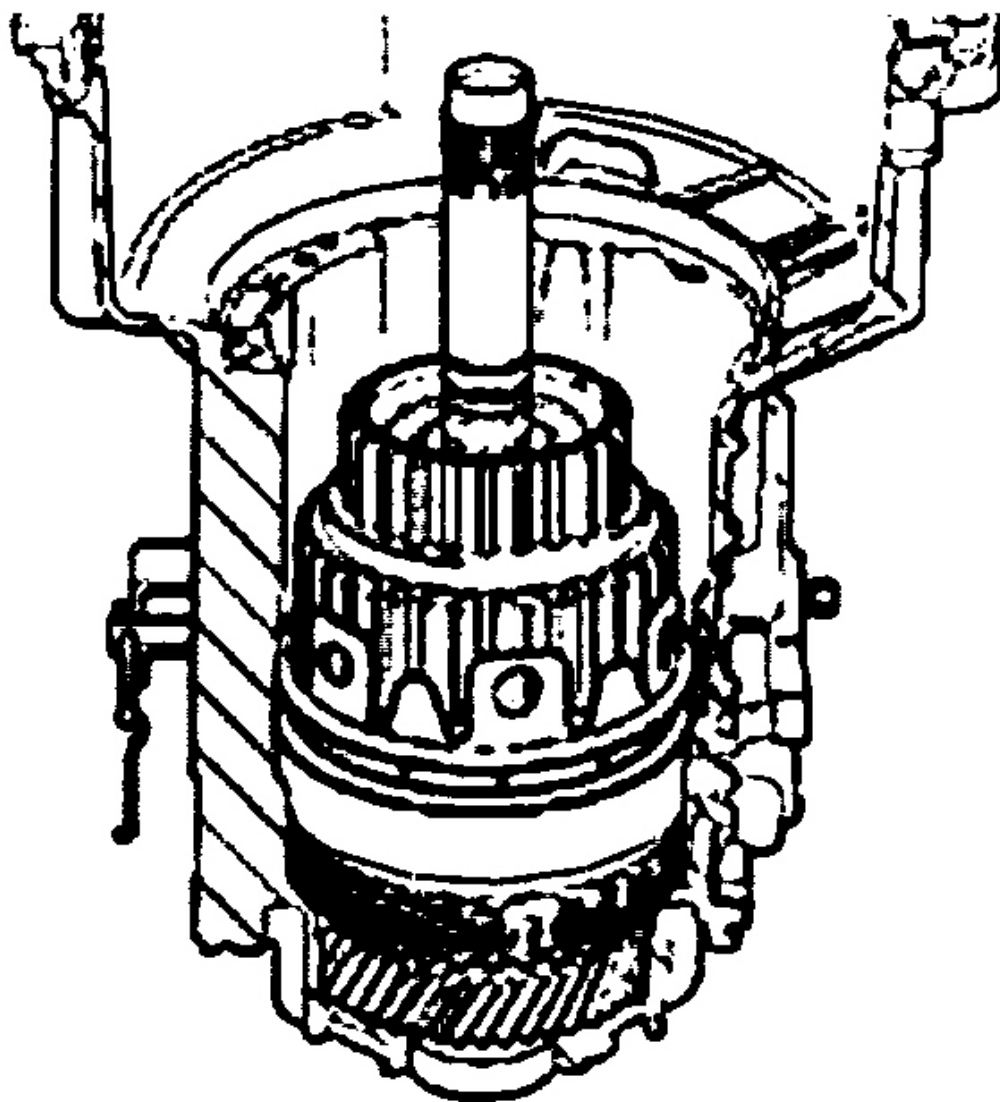


G00387933

Fig. 78: Locating Piston Rings On -K3-
Courtesy of VOLKSWAGEN UNITED STATES, INC.

Make sure that ends of piston rings are hooked together.

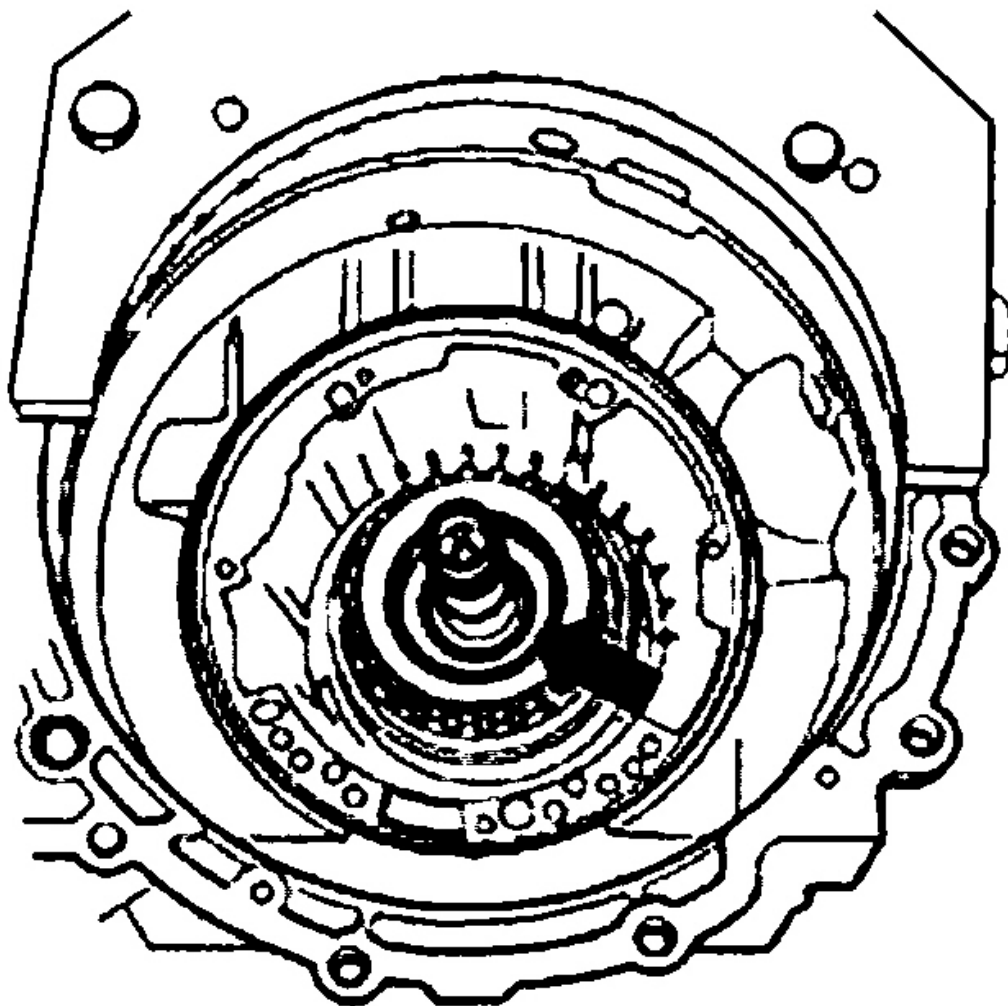
Insert 1st to 3rd gear clutches -K1- with 3rd and 4th gear clutch -K3-. See **Fig. 79** .



G00387934

Fig. 79: Install 1st-3rd Gear Clutches -K1- W/ 3rd & 4th Gear Clutch -K3-
Courtesy of VOLKSWAGEN UNITED STATES, INC.

Insert shims -arrow- in -K1-. See **Fig. 80** .



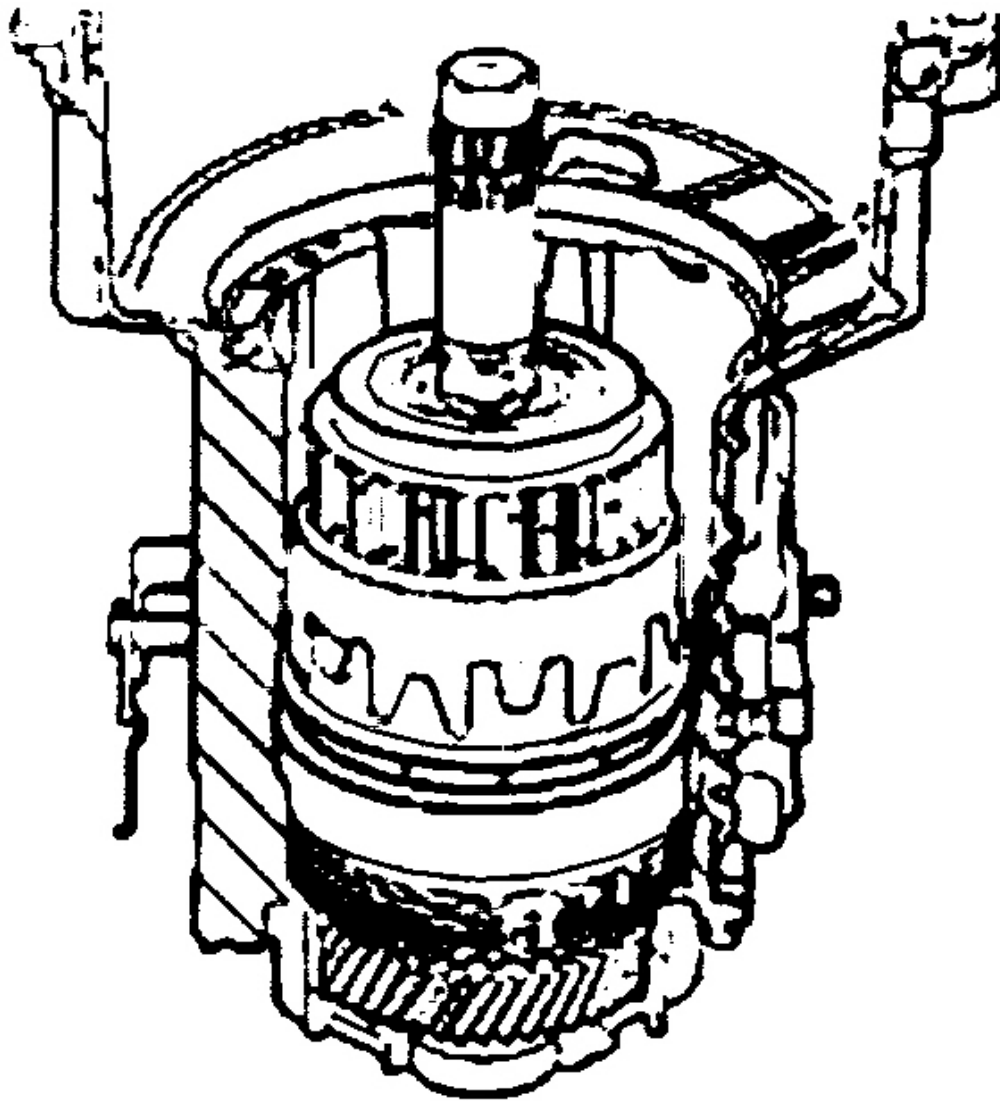
G00387935

Fig. 80: Installing Shims in -K1-
Courtesy of VOLKSWAGEN UNITED STATES, INC.

NOTE: Remeasure shim when replacing -K1-, -K2- or ATF pump, adjusting clutch play between -K1- and -K2-. See CLUTCH PLAY BETWEEN -K1- AND -K2-, ADJUSTING . 1 or 2 shims can be installed.

Insert reverse gear clutch -K2-. See **Fig. 81** . Insert supporting tube for -B2- plate set (arrow) so that supporting tube groove engages in freewheel wedge.

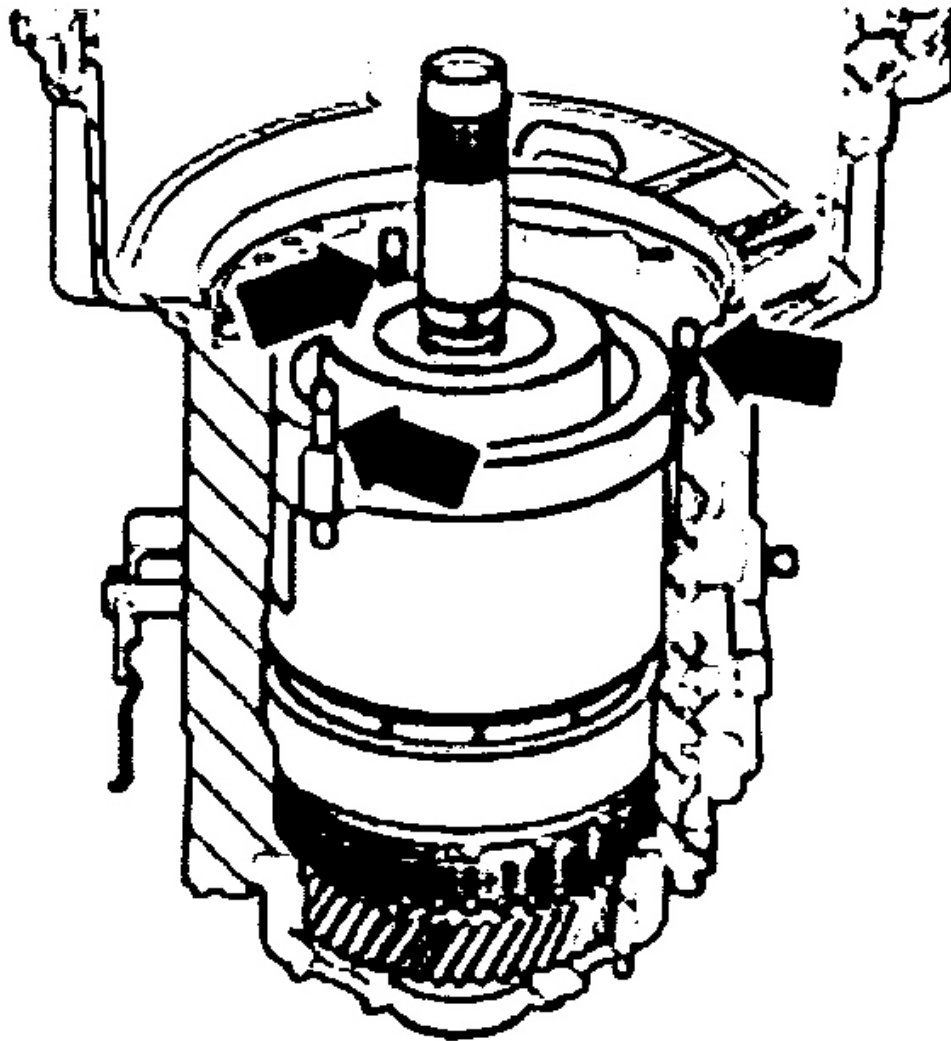
Insert reverse gear clutch -K2-. See **Fig. 81** .



G00387936

Fig. 81: Installing Reverse Gear Clutch -K2-
Courtesy of VOLKSWAGEN UNITED STATES, INC.

Insert supporting tube for -B2- plate set (arrow) so that supporting tube groove engages in freewheel wedge. See **Fig. 82** .



G00387937

Fig. 82: Installing Supporting Tube For -B2- Plate Set
Courtesy of VOLKSWAGEN UNITED STATES, INC.

Install -B2- plates as follows:

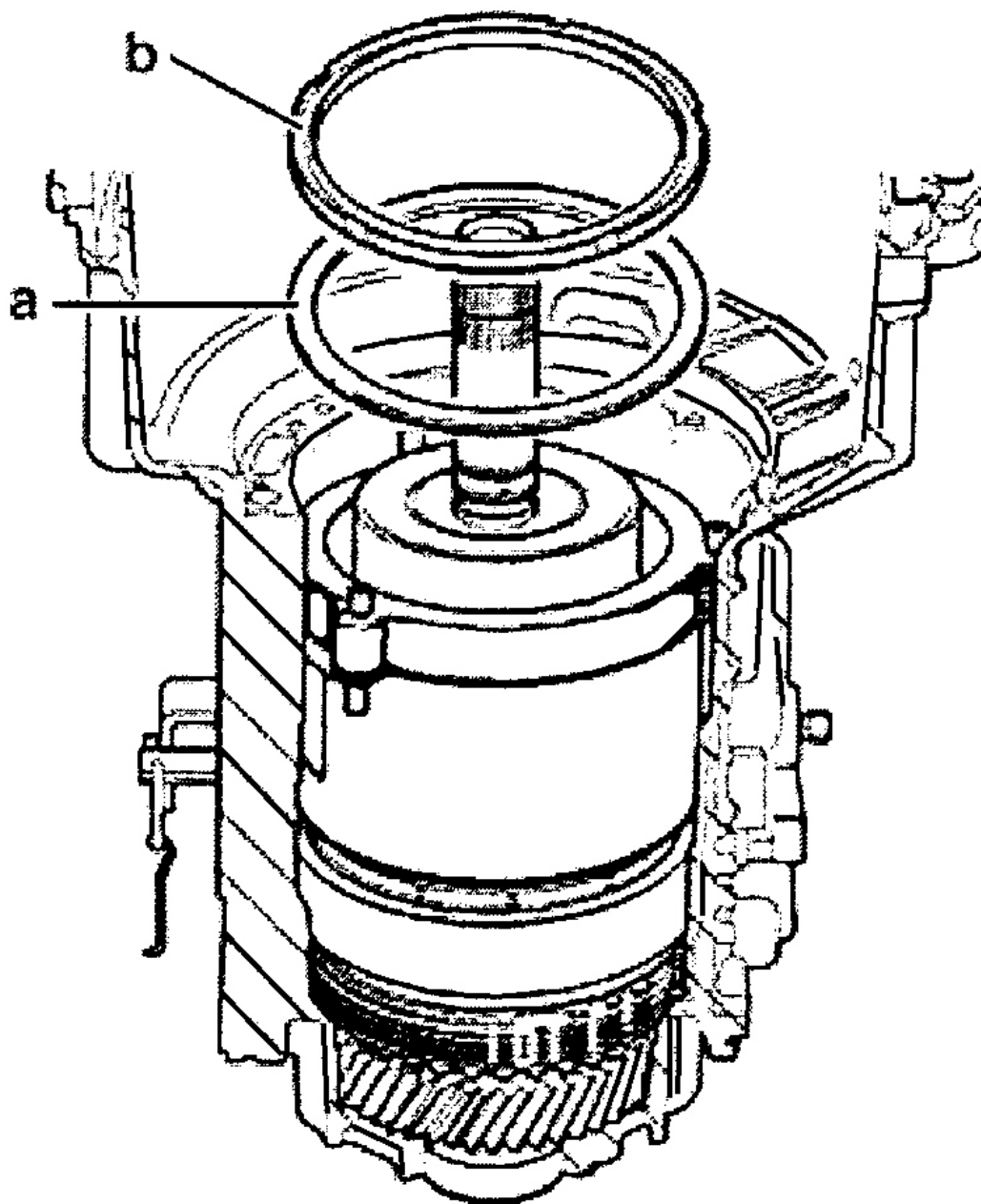
- First insert a 3 mm thick outer plate.
- Insert three spring caps in outer plate.
- Insert compression springs (arrows).
- Insert all but last outer plate.

- Insert three spring caps onto compression springs.
- Insert last outer plate -3 mm thick-.

Determine shim thickness. See **2ND AND 4TH GEAR BRAKE -B2-, ADJUSTMENT** .

Install shim -a-. See **Fig. 83** .

Insert retaining ring -b- onto shim. Smooth side facing shim. See **Fig. 83** .



G00387938

Fig. 83: Installing Shim & Retaining Ring
Courtesy of VOLKSWAGEN UNITED STATES, INC.

When replacing the following component, then the 2nd and 4th gear brakes -B2- are to be adjusted. See 2ND

AND 4TH GEAR BRAKE -B2-, ADJUSTMENT :

- the transmission housing
- Supporting tube
- the ATF pump
- retaining ring
- or the plates

NOTE: **These components are assigned as replacement parts according to transmission code letters.**

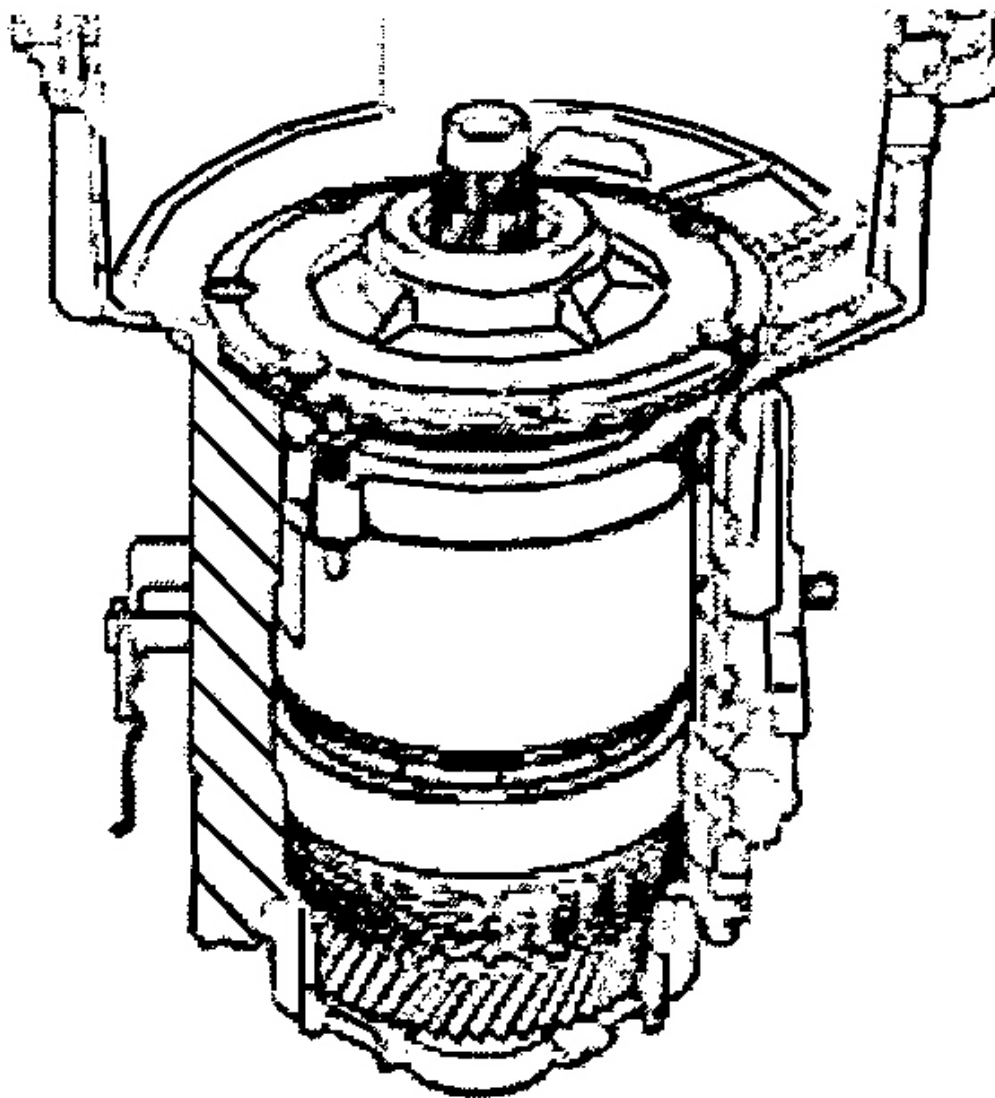
Clean strainer.

Install strainer. See **Fig. 57** .

Strainer is located in ATF cooler pipe.

Install ATF pump seal. Install O-ring on ATF pump. Tighten bolts evenly, in a diagonal pattern. See **Fig. 84** . Turn bolts 90° further after initial tightening torque. Turning further can be done in several stages.

NOTE: **Make sure that the O-ring is not damaged. Initial tightening torque: 8 Nm.**



G00387939

Fig. 84: Installing ATF Pump
Courtesy of VOLKSWAGEN UNITED STATES, INC.

Carry out check measurement of clutch play. See **Check Measurement (Clutch Play)** .

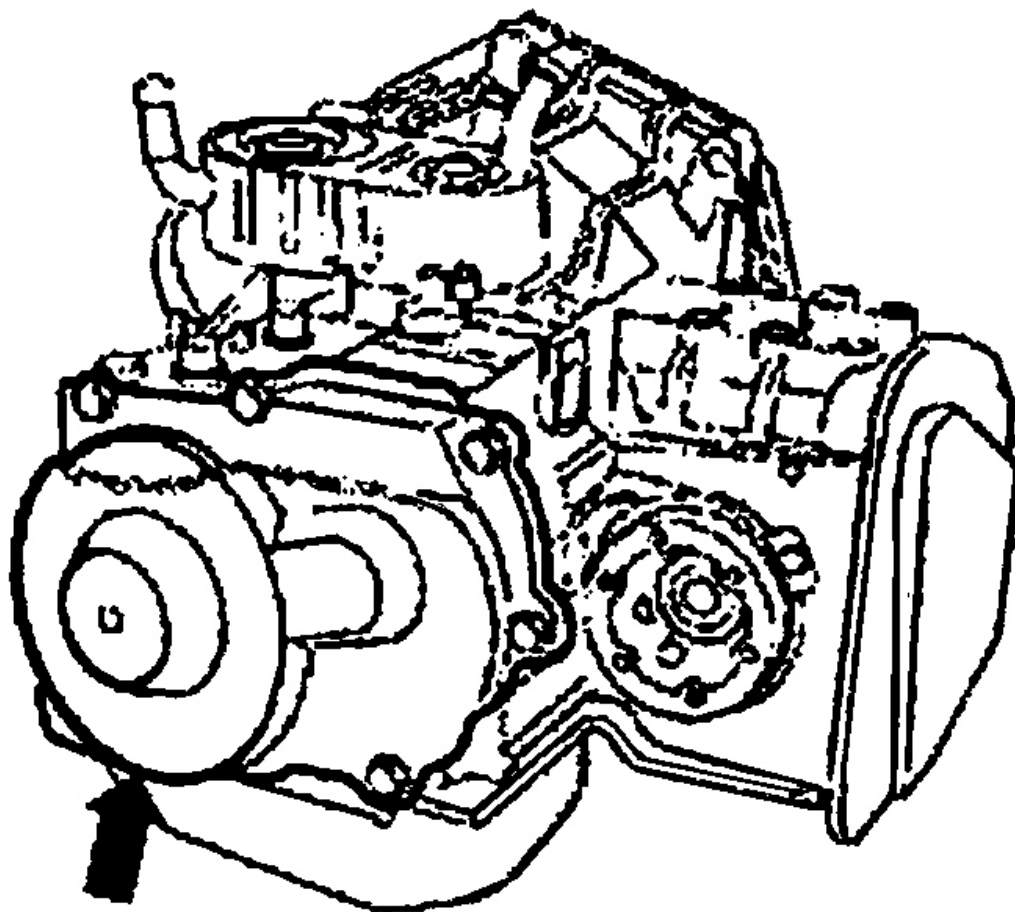
Insert sealing plugs with O-rings -arrow-. See **Fig. 54** . Installation position: Lug engages in oil channel.

Install valve body with conductor strip. See **CONDUCTOR STRIP WITH INTEGRATED**

TRANSMISSION FLUID TEMPERATURE SENSOR -G93- in DIAGNOSIS - 01M article.

Install transmission oil pan. See **VALVE BODY, REMOVING AND INSTALLING** .

Install cover (arrow) with gasket and spacer bushings. See **Fig. 85** . Tightening torque: 8 Nm.

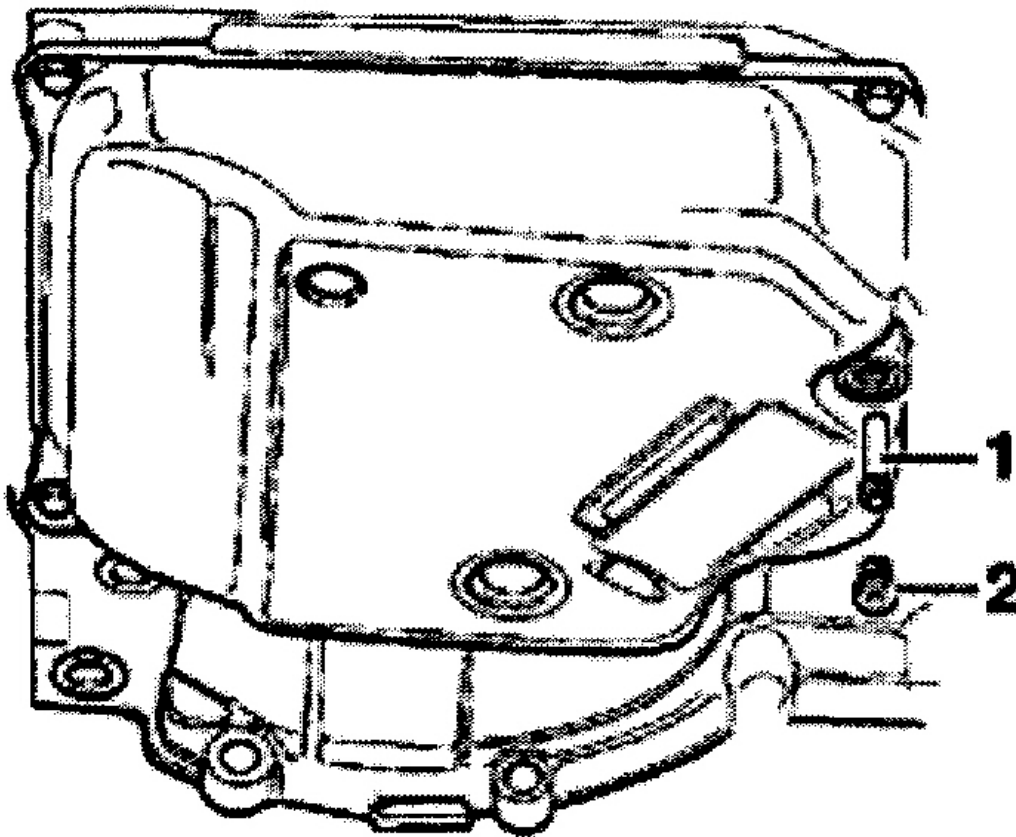


G00387940

Fig. 85: Locating Transmission Cover

Courtesy of VOLKSWAGEN UNITED STATES, INC.

Thread in ATF overflow pipe -1- and sealing plug -2- with new seal hand tight. See **Fig. 86** .



G00380859

Fig. 86: Locating Plug & Overflow Pipe

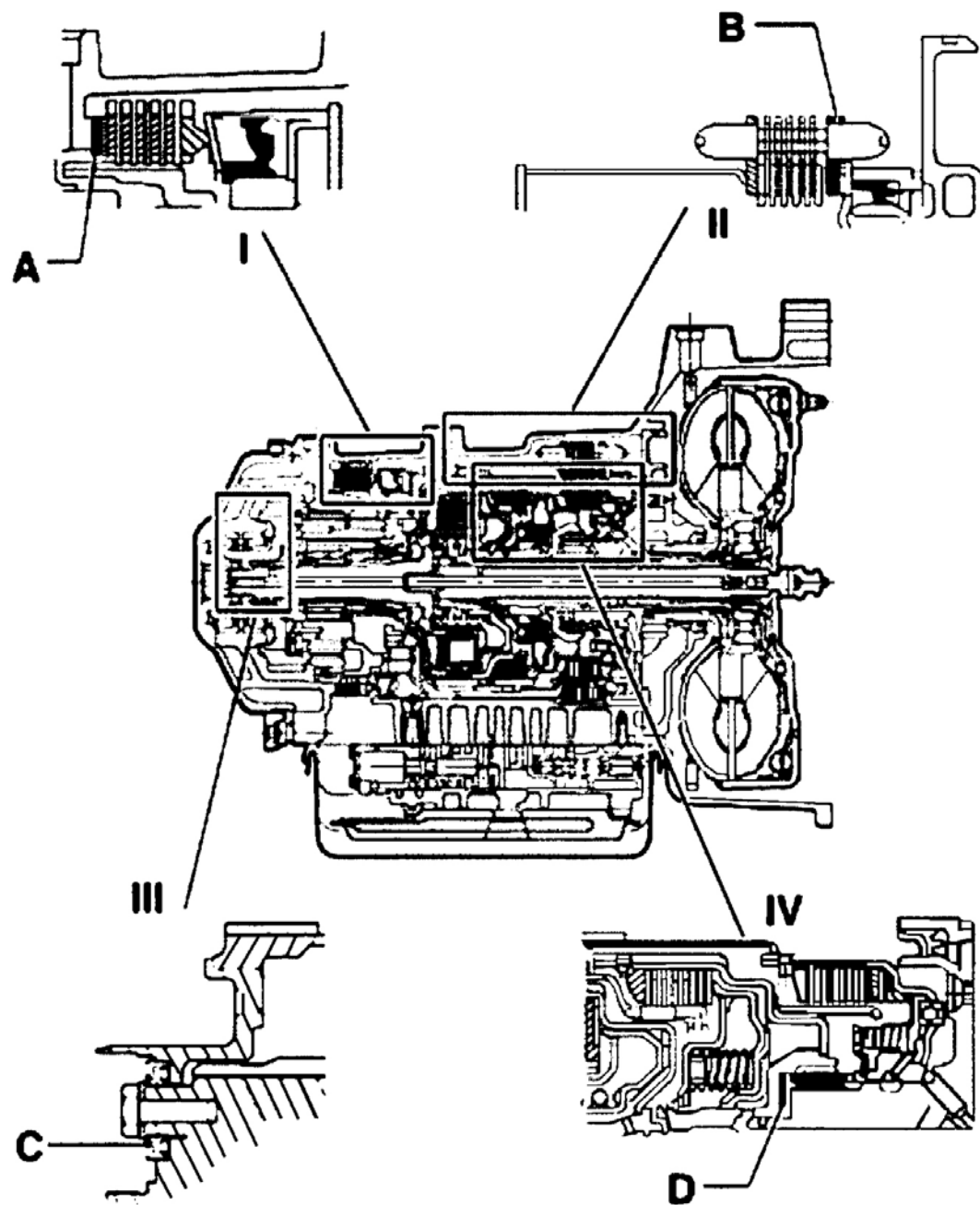
Courtesy of VOLKSWAGEN UNITED STATES, INC.

Install torque converter.

Install transmission. See **REMOVAL & INSTALLATION - A/T (01M)** article.

Fill with 3 liters of ATF and check ATF level and top off. See **SERVICING - A/T (01M)** .

OVERVIEW OF ALL PLANETARY TRANSMISSION ADJUSTMENTS



I = Reverse gear brake -B1-

♦ A - Shim

II = 2nd and 4th gear brake -B2-

♦ B - Outer plate or shim

III = Planet carrier

♦ C - Shim

IV = Clutch play

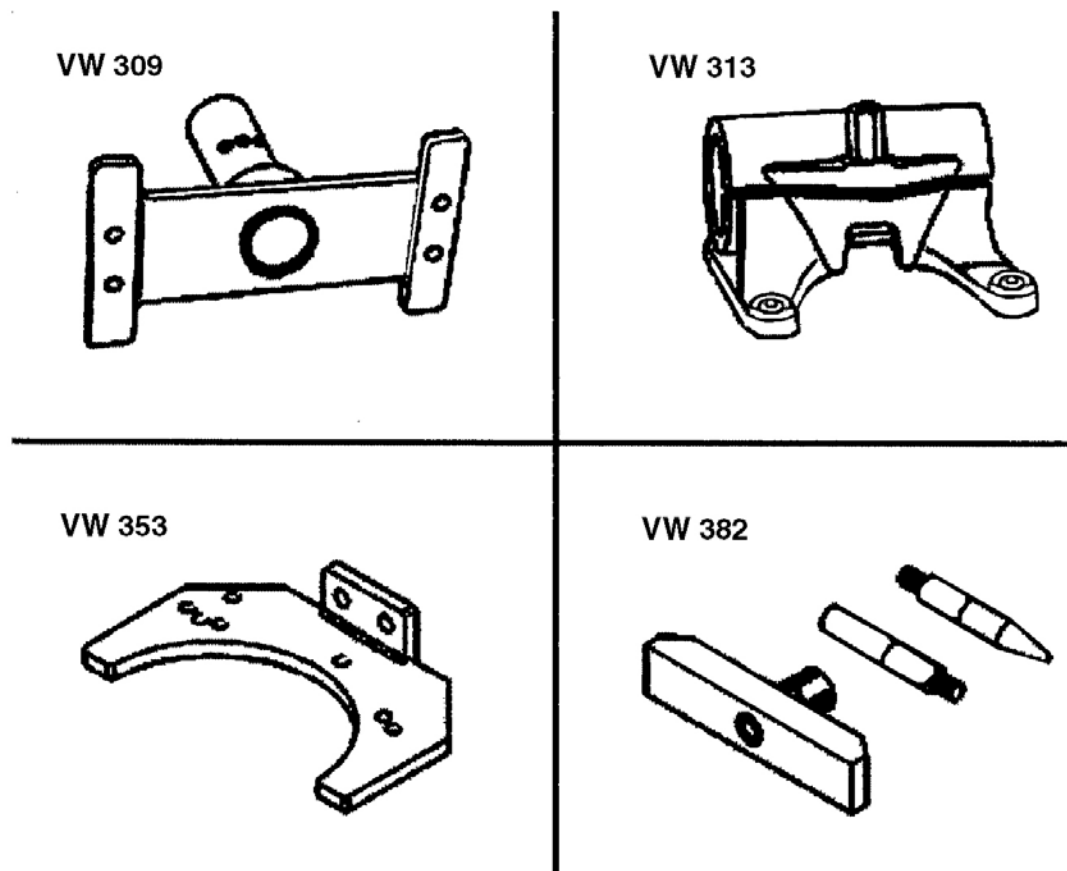
♦ D - Shim

Fig. 87: Overview Of All Planetary Transmission Adjustments
Courtesy of VOLKSWAGEN UNITED STATES, INC.

PLANET CARRIER, ADJUSTING

Special Tools And Equipment

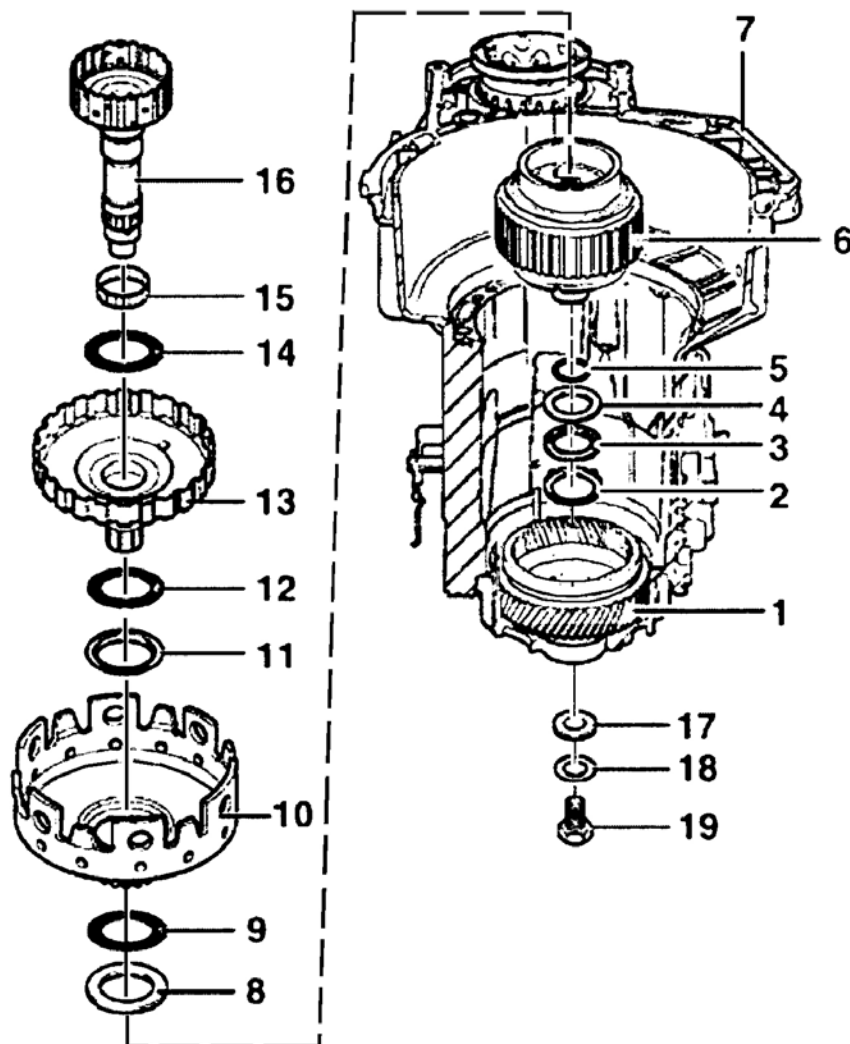
- VW 309 Holding plate
- VW 313 Support clamp
- VW 353 Transmission support
- VW 382 Measuring device
- Dial gauge



G00387942

Fig. 88: Planet Carrier Adjusting Special Tools
Courtesy of VOLKSWAGEN UNITED STATES, INC.

Overview Of Components To Adjust Planet Carrier



Overview of components to adjust planet carrier

- When adjusting planet carrier install components in transmission housing without shim (item - 17 -).

1 - Input gear

- ♦ Do not remove to adjust planet carrier

2 - Axial needle bearing washer

- ♦ Insert smooth side in input gear

3 - Axial needle bearing

4 - Axial needle bearing washer

5 - O-ring

6 - Planet carrier

7 - Transmission housing

- ♦ With input gear and axial needle bearing
- ♦ Axial needle bearing remains in input gear

8 - Washer

9 - Axial needle bearing

10 - Large sun gear

11 - Washer

12 - Axial needle bearing

13 - Large drive shaft

14 - Axial needle bearing

15 - Needle bearing

16 - Small drive shaft

17 - Shim

- ♦ Do not install in planet carrier when adjusting

18 - Washer

19 - Small drive shaft bolt, 30 Nm

Fig. 89: Overview Of Components To Adjust Planet Carrier
Courtesy of VOLKSWAGEN UNITED STATES, INC.

Determining shim -A- (Planet Carrier)

See **Fig. 90** .

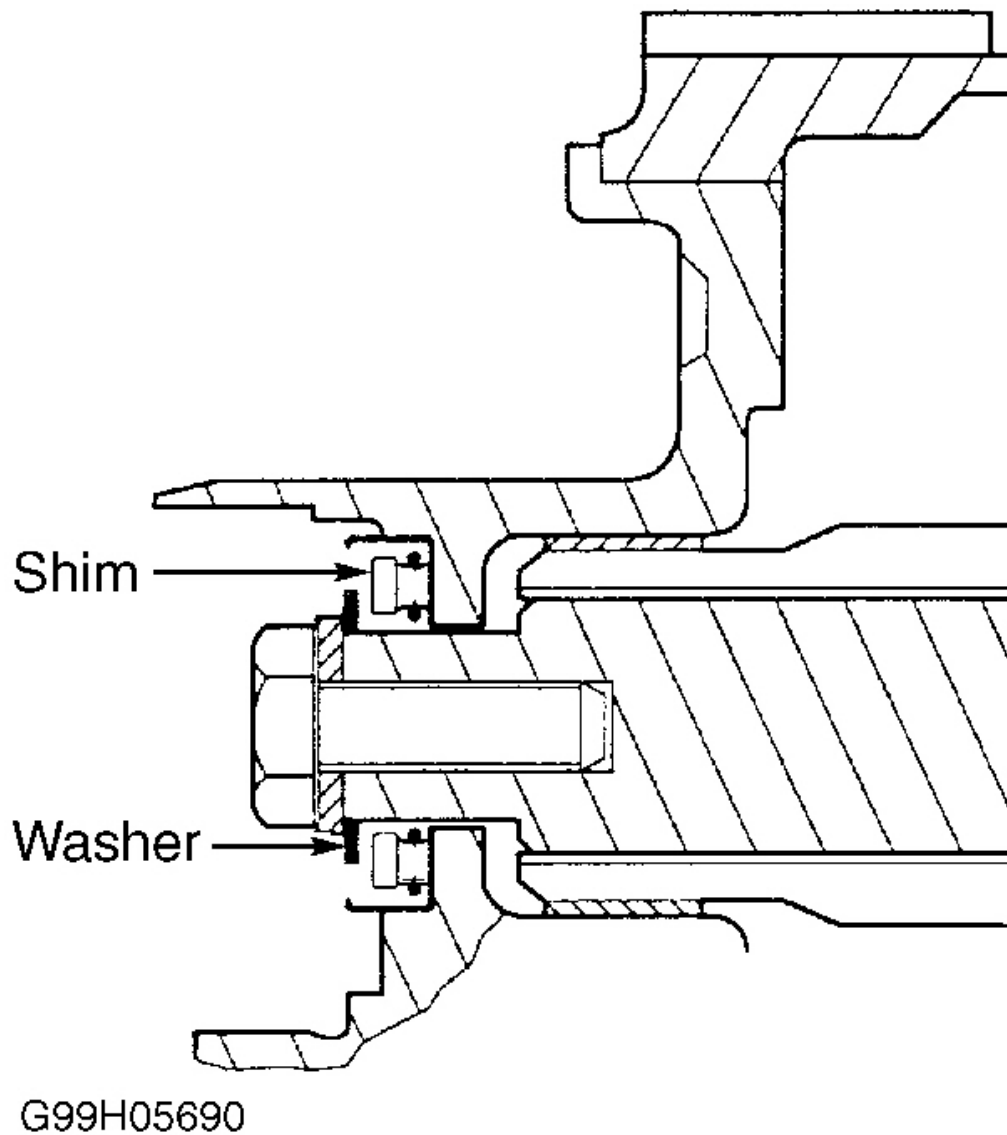


Fig. 90: View Of Planetary Carrier Shim (A) End Play
Courtesy of VOLKSWAGEN UNITED STATES, INC.

Install all components (items - 2 - to - 16 -) to adjust planet carrier into transmission housing. See **Fig. 89** .

Insert screwdriver through hole of large sun gear to loosen and tighten bolt for small input shaft. See **Fig. 59** .

Install small input shaft bolt -1- with washer -2- but without shim. See **Fig. 91** . Tightening torque: 30 Nm.

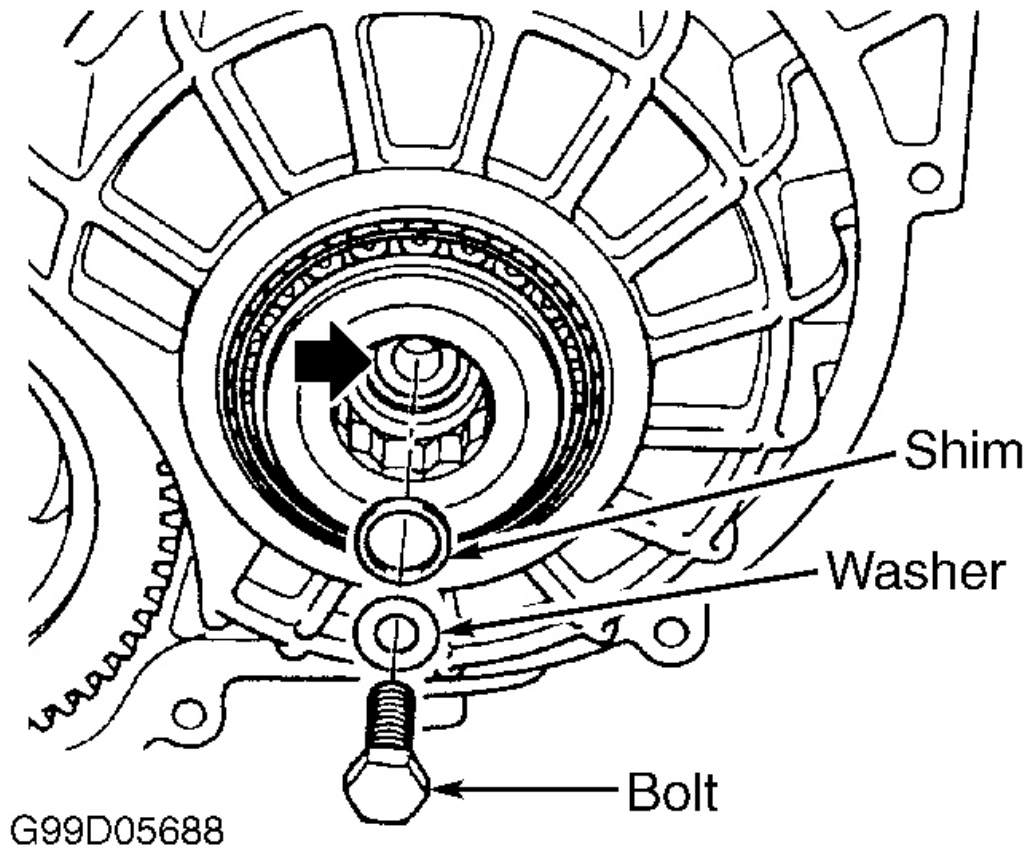


Fig. 91: Installing Small Planetary Driveshaft Bolt
Courtesy of VOLKSWAGEN UNITED STATES, INC.

Install dial gauge in VW 382/7.

Set up dial gauge so that top of gauge is positioned on bolt head center with 1 mm preload. See **Fig. 92** . Zero dial gauge. Move small input shaft up and take reading.

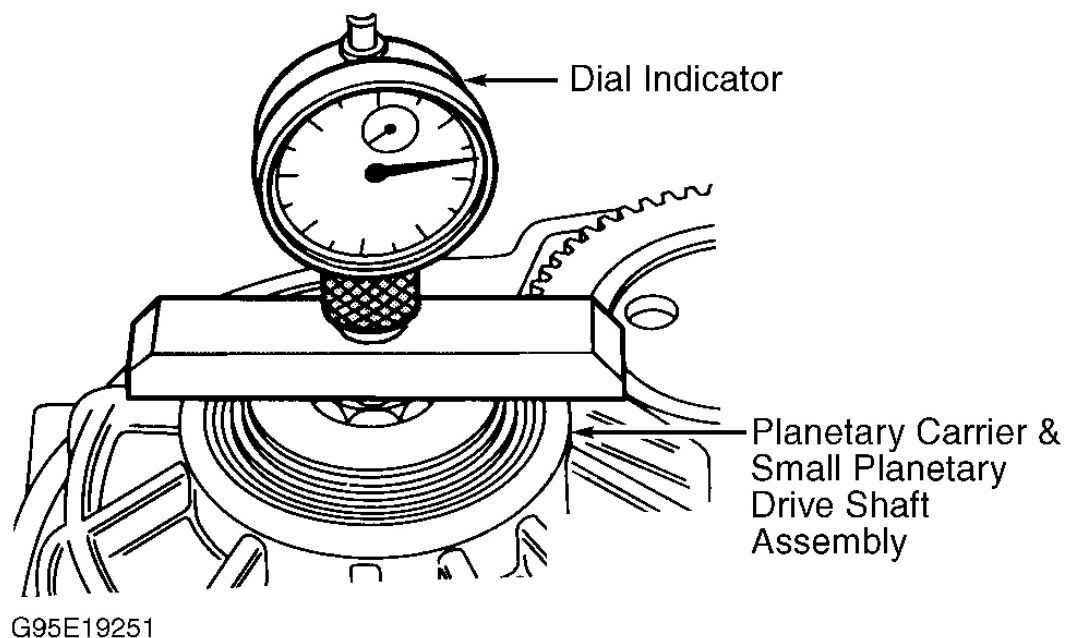


Fig. 92: Adjusting Planetary Carrier End Play
 Courtesy of VOLKSWAGEN UNITED STATES, INC.

Example: Reading 2.00 mm. Determine thickness of shim using table and find Part No. in parts catalog. See **PLANET CARRIER SHIMS** .

PLANET CARRIER SHIMS

Gauge Reading (mm)	Shims (mm)
1.26-1.35	1.0
1.36-1.45	1.1
1.46-1.55	1.2
1.56-1.65	1.3
1.66-1.75	1.4
1.76-1.85	1.5
1.86-1.95	1.6
1.96-2.05	1.7
2.06-2.15	1.8
2.16-2.25	1.9
2.26-2.35	2.0
2.36-2.45	2.1
2.46-2.55	2.2
2.56-2.65	2.3

2.66-2.75	2.4
2.76-2.85	2.5
2.86-2.95	2.6
2.96-3.05	2.7
3.06-3.15	2.8
3.16-3.25	2.9

Example: Measured value 2.00 mm = Insert 1.7 mm thick shim.

Remove small input shaft bolt.

Insert correct shim -3- on small input shaft -arrow-. See **Fig. 91** .

Tighten small input shaft bolt -1- with washer -2-. Tightening torque 30 Nm.

Carry out planet carrier check measurement. See **Planet Carrier Check Measurement** .

Planet Carrier Check Measurement

Insert dial gauge in VW 382/7 and place tip on bolt of small input shaft. See **Fig. 92** .

Move small input shaft up and down and take reading of play on dial gauge.

Play: Min. = 0.23 mm. Max. = 0.37 mm

NOTE: If the planet carrier has been adjusted with reverse gear brake -B1- and free wheel removed then before installing planet carrier install reverse gear brake -B1-. See **Assembling Transmission** .

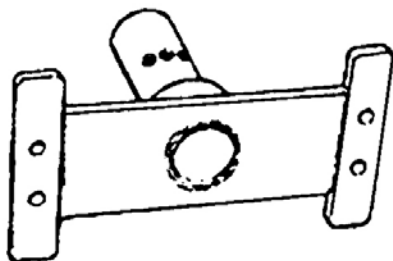
REVERSE GEAR BRAKE -B1-, ADJUSTING

Number of inner and outer plates varies based on transmission code. For correct number used, see **CODE LETTERS, TRANSMISSION APPLICATION, RATIOS, EQUIPMENT** .

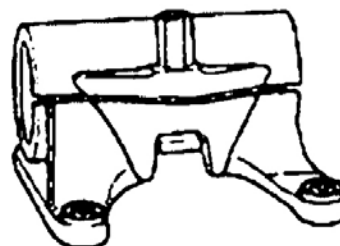
Special Tools And Equipment

- VW 309 Holding plate
- VW 313 Support clamp
- VW 353 Transmission support
- VW 402 Thrust plate
- Depth gauge
- Straightedge
- Feeler gauges

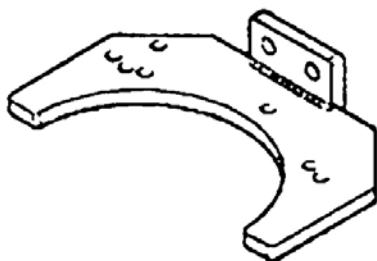
VW 309



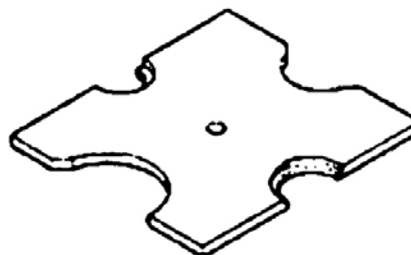
VW 313



VW 353



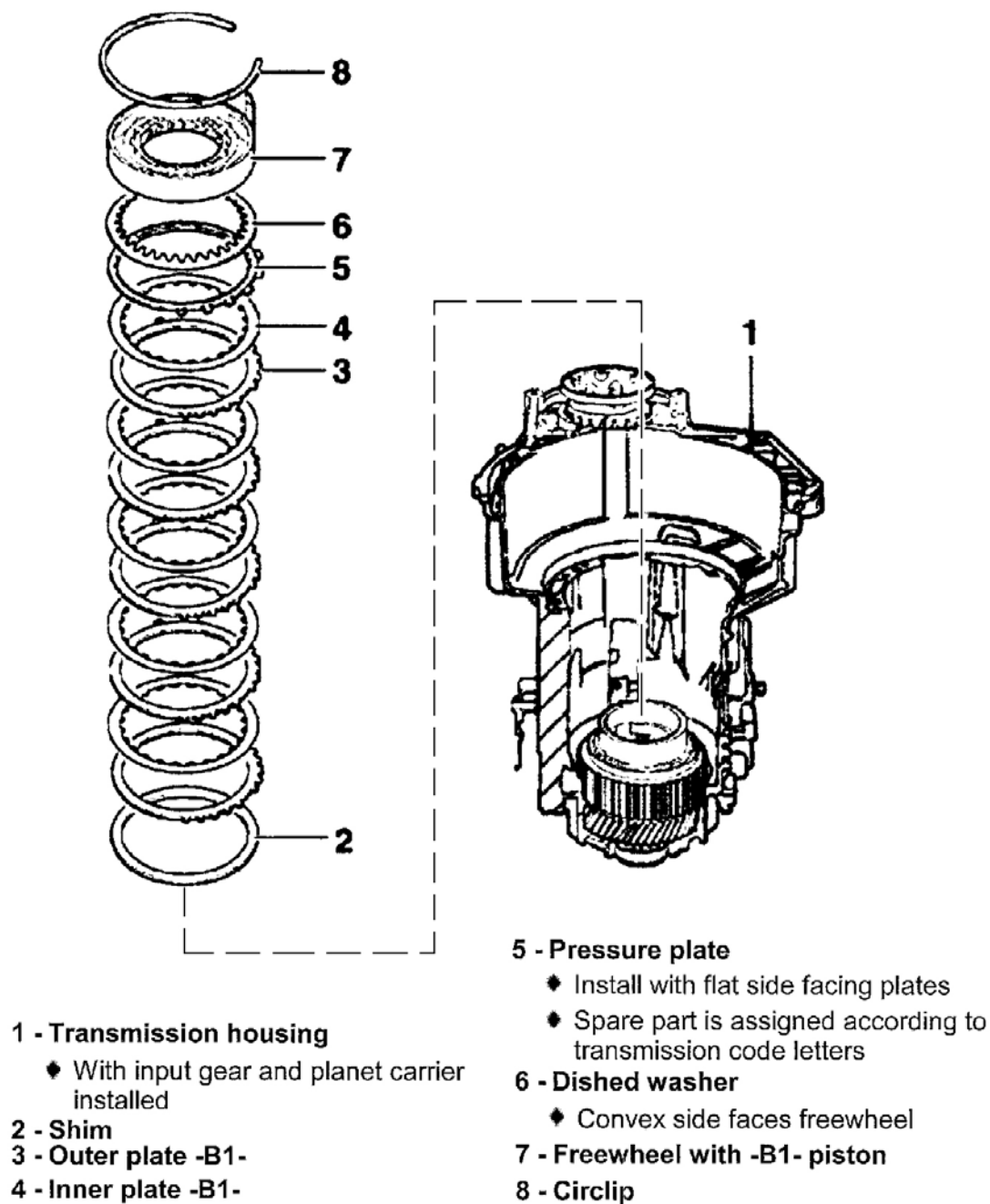
VW 402



G00387944

Fig. 93: Identifying Reverse Gear Adjustment Special Tools (Reverse Gear Brake -B1-)
Courtesy of VOLKSWAGEN UNITED STATES, INC.

Overview Of Components To Adjust Reverse Gear Brake -B1-



G00387945

Fig. 94: Overview Of Components To Adjust Reverse Gear Brake -B1-
 Courtesy of VOLKSWAGEN UNITED STATES, INC.

Determining Shim -A- Thickness (Reverse Gear Brake -B1-)

For the measuring sequence the transmission housing must be clamped into the assembly stand so that the input

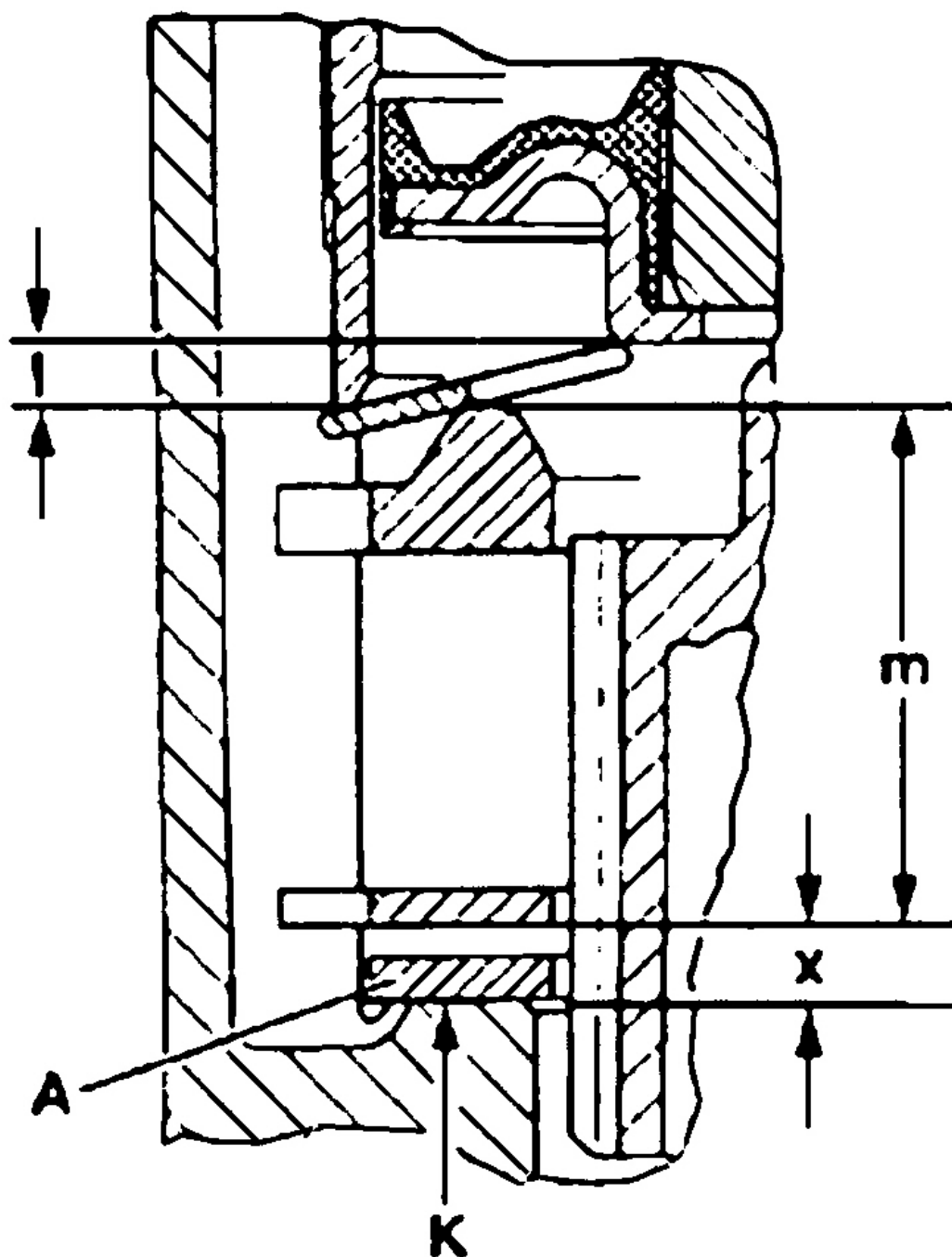
gear is facing downward, as illustrated. See **Fig. 94** .

For explanation of callouts in **Fig. 94** , see the following:

- A = Shim
- x = Gap
- I = Position of piston in freewheel
- m = Height of plate set including pressure plate
- K = Constant = 26.9 mm

"K" is determined by installation height in transmission housing and is not adjustable

Shim thickness is determined by gap "x" and selected from table. See **Table Of Shims (Reverse Gear Brake - B1-)** .

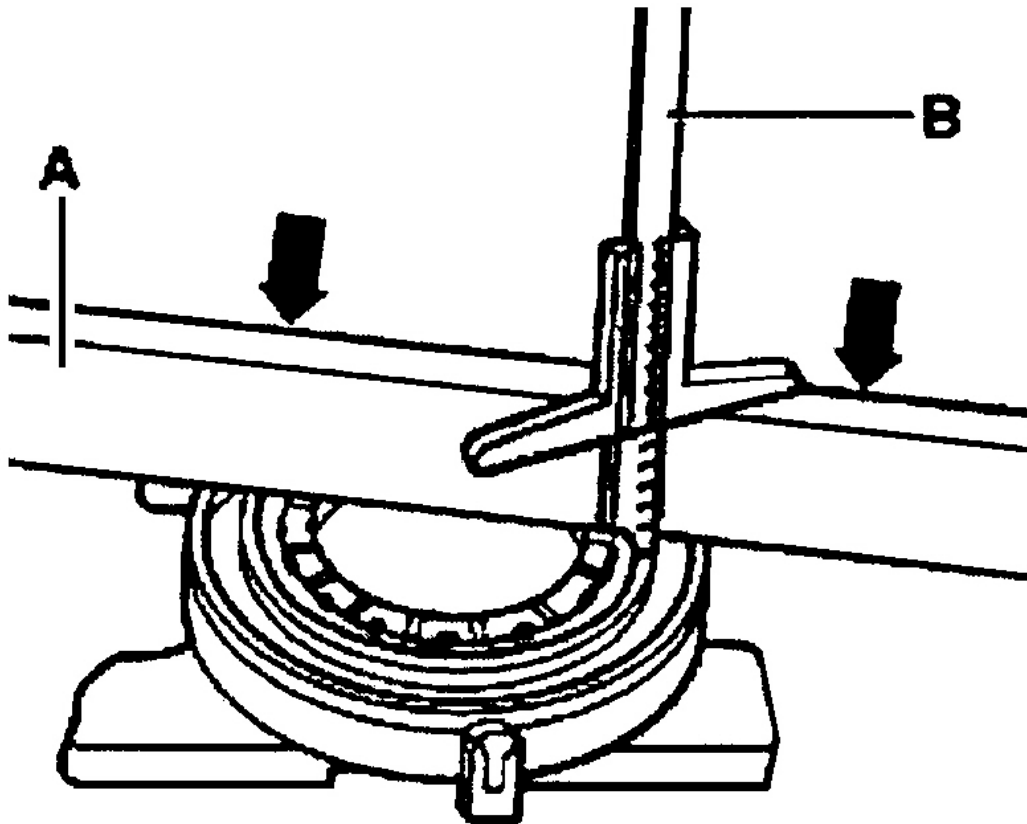


G00387946

Fig. 95: Identifying Shim Measurements (Reverse Gear Brake -B1-)
 Courtesy of VOLKSWAGEN UNITED STATES, INC.

Calculating "I" (Reverse Gear Brake -B1-)

Press piston in direction of arrow as far as stop. See **Fig. 96** .



G00387947

Fig. 96: Calculating "I" (Reverse Gear Brake -B1-)
Courtesy of VOLKSWAGEN UNITED STATES, INC.

Place straightedge "A" onto outer race of freewheel.

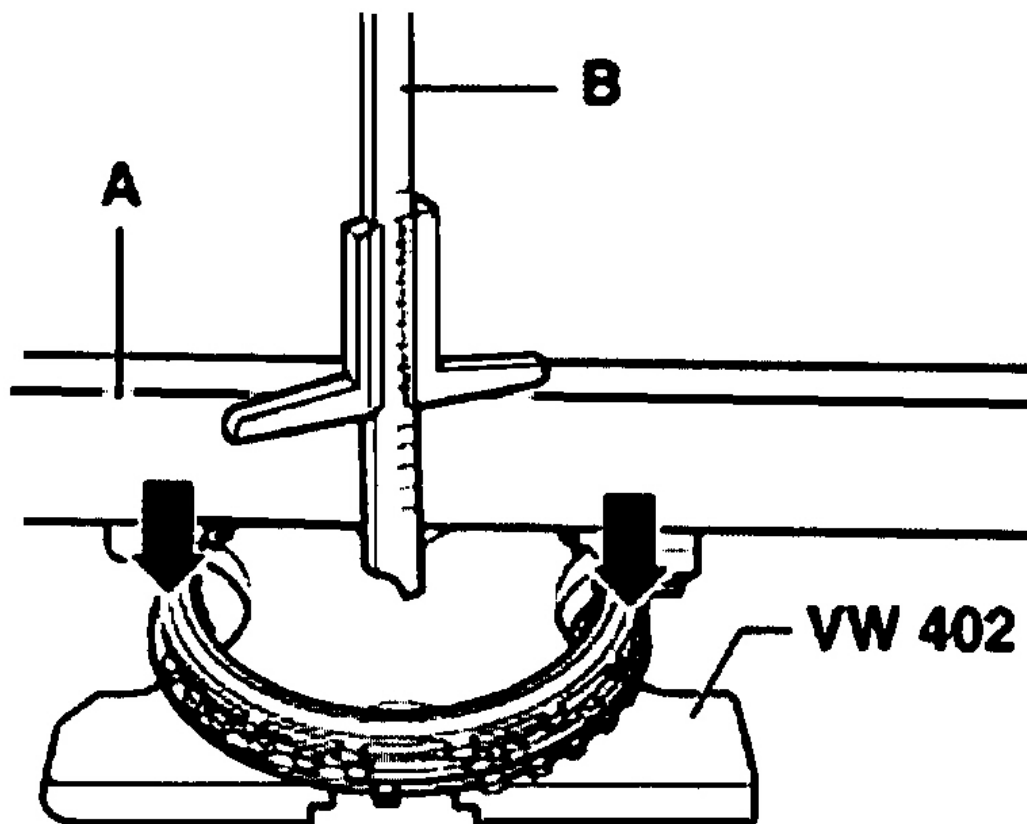
Measure to inner edge of piston with depth gauge "B".

Example:

- "start" Reading = 51.8 mm
- "minus" Straightedge = 48.2 mm
- "equals" Calculated size $l = 3.6$ mm

Calculating "M" (Reverse Gear Brake -B1-)

Place straightedge "A" on thrust plate. See .



G00387948

Fig. 97: Calculating "M" (Reverse Gear Brake -B1-)
Courtesy of VOLKSWAGEN UNITED STATES, INC.

Compress set of plates including pressure plate in direction of arrow and measure the thickness of plate set with depth gauge "B".

Example:

- "start" Reading = 73.5 mm
- "minus" Straightedge = 48.2 mm
- "equals" Calculated size $l = 25.3$ mm

Determine Gap "X" (Reverse Gear Brake -B1-)

A sample calculation would be:

- $x = k + 1 / 2 - m$
- $x = 26.9 + 3.6 / 2 - 25.3 = 3.4 \text{ mm}$

Determine size of shims according to table: See **REVERSE GEAR BRAKE SHIMS** .

Calculate thickness of shims according to table and determine Part No. from parts catalog.

After determining shim for -B1- carry out **Reverse Gear Brake -B1- Check Measurement** .

Table Of Shims (Reverse Gear Brake -B1-)

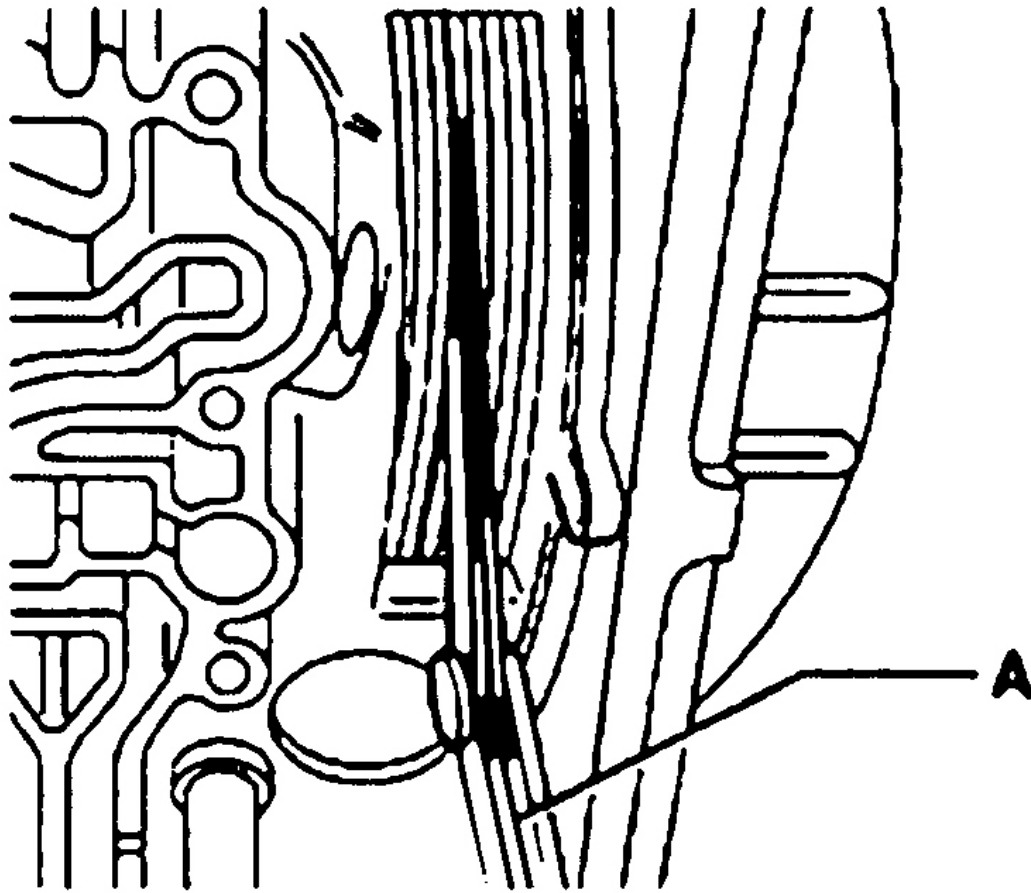
REVERSE GEAR BRAKE -B1- SHIMS

Gap (mm)	Shim - mm
2.36-2.45	1.0
2.46-2.55	1.1
2.56-2.65	1.2
2.66-2.75	1.3
2.76-2.85	1.4
2.86-2.95	1.5
2.96-3.05	1.6
3.06-3.15	1.7
3.16-3.25	1.8
3.26-3.35	1.9
3.36-3.45	1.0+1.0
3.46-3.55	1.0+1.1
3.56-3.65	1.1+1.1
3.66-3.75	1.1+1.2
3.76-3.85	1.2+1.2
3.86-3.95	1.2+1.3
3.96-4.05	1.3+1.3
4.06-4.15	1.3+1.4
4.16-4.25	1.4+1.4

Reverse Gear Brake -B1- Check Measurement

Install parts up to freewheel and secure with circlip. See **Assembling Transmission** .

Measure play between plates with feeler gauge "A". See **Fig. 98** .



G00387949

Fig. 98: Reverse Gear Brake -B1- Check Measurement
Courtesy of VOLKSWAGEN UNITED STATES, INC.

Play:

- Min. = 1.25 mm
- Max. = 1.55 mm

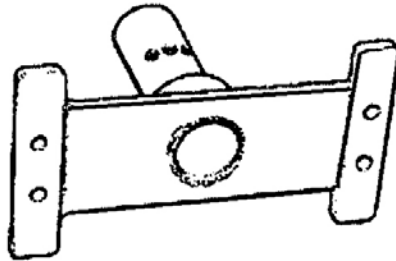
CLUTCH PLAY BETWEEN -K1- AND -K2-, ADJUSTING

Special Tools And Equipment

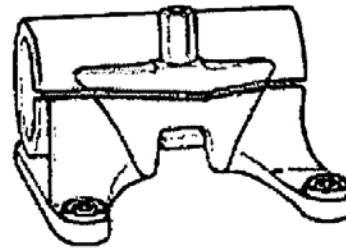
- VW 309 Holding plate
- VW 313 Support clamp

- VW 353 Transmission support
- VW 387 Universal dial gauge bracket
- Depth gauge
- Straightedge
- Dial gauge

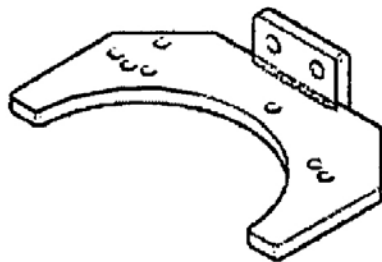
VW 309



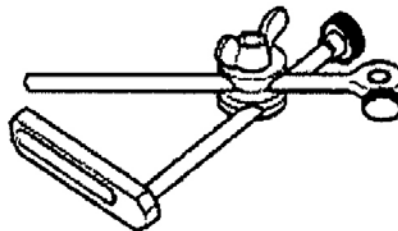
VW 313



VW 353

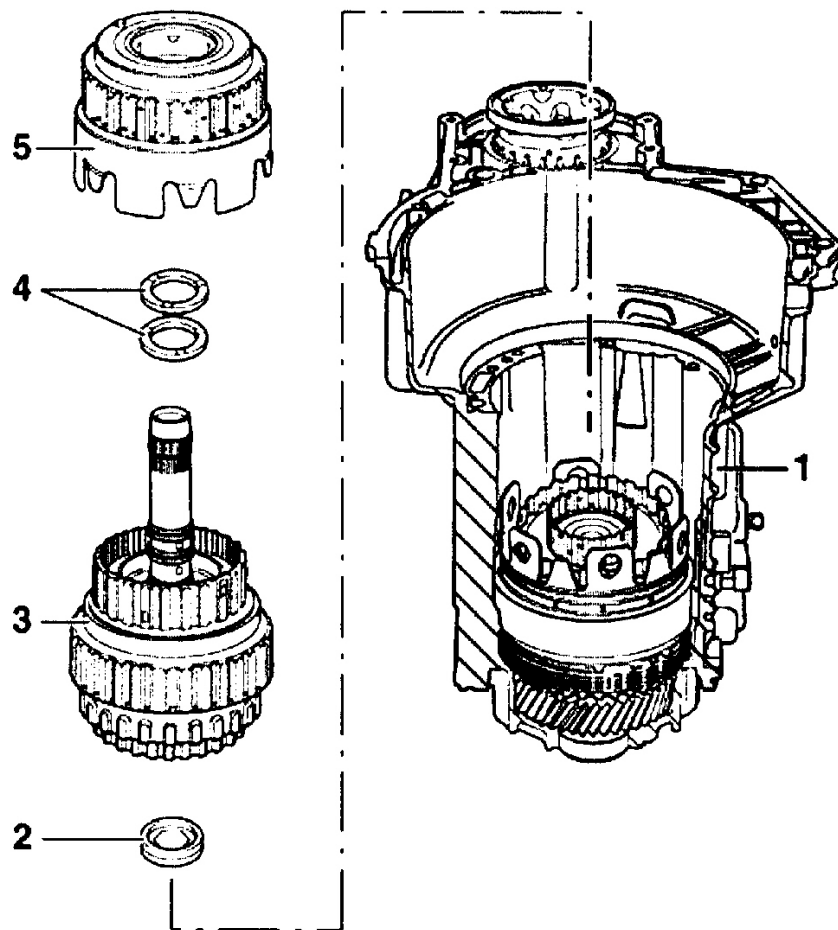


VW 387



G00387950

Fig. 99: Clutch Play Between -K1- & -K2- Adjusting Special Tools
Courtesy of VOLKSWAGEN UNITED STATES, INC.



1 - Transmission housing

2 - Axial needle bearing with washer

◆ Axial needle bearing faces small input shaft

◆ Washer faces toward-K3-

3 - 1st to 3rd gear clutch -K1- with 3rd and 4th gear clutch -K3-

◆ The clutches -K1- and -K3- are pressed together

4 - Shims

◆ Do not install when adjusting clutch play

◆ 1 or 2 shims can be installed

5 - Reverse gear clutch -K2-

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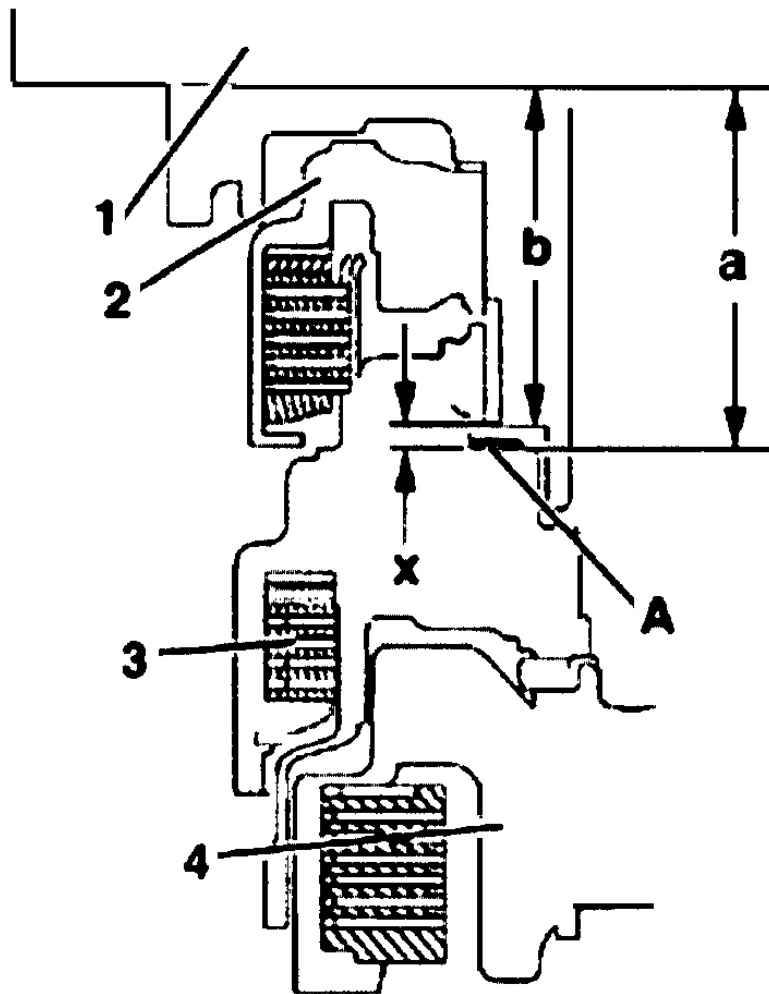
Fig. 100: Overview Of Clutch Play Between -K1- & -K2-
Courtesy of VOLKSWAGEN UNITED STATES, INC.

Conditions

- Planet carrier installed and adjusted. See **Assembling Transmission** .
- For the measuring sequence the transmission housing must be clamped into the assembly stand so that the input gear is facing downward. See **Fig. 100** .

Determining Shim -A- (-K1- & -K2-)

Calculating thickness of shim. Determine gap "x" and calculate shim thickness. See **Fig. 101** .



A - Shim

1 - ATF pump

2 - Reverse gear clutch -K2-

3 - 1st to 3rd gear clutch -K1-

4 - 4th gear clutch -K3-

G00387952

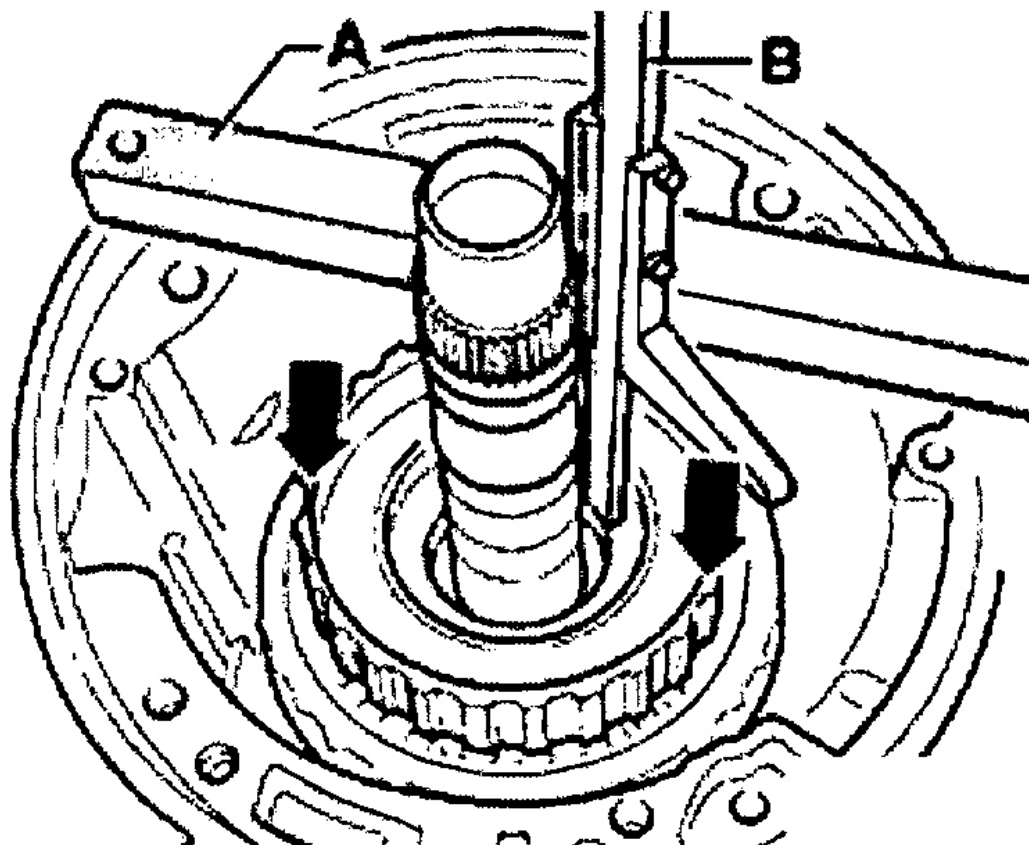
Fig. 101: Determining Shim -A- (-K1- & -K2-)
 Courtesy of VOLKSWAGEN UNITED STATES, INC.

Gap $x = a - b$

Calculating "a"(-K1- & -K2-)

For the measuring sequence the transmission housing must be clamped into assembly stand so that the input gear is facing downward. See **Fig. 100** .

Place straightedge "A" onto transmission housing. See **Fig. 102** .



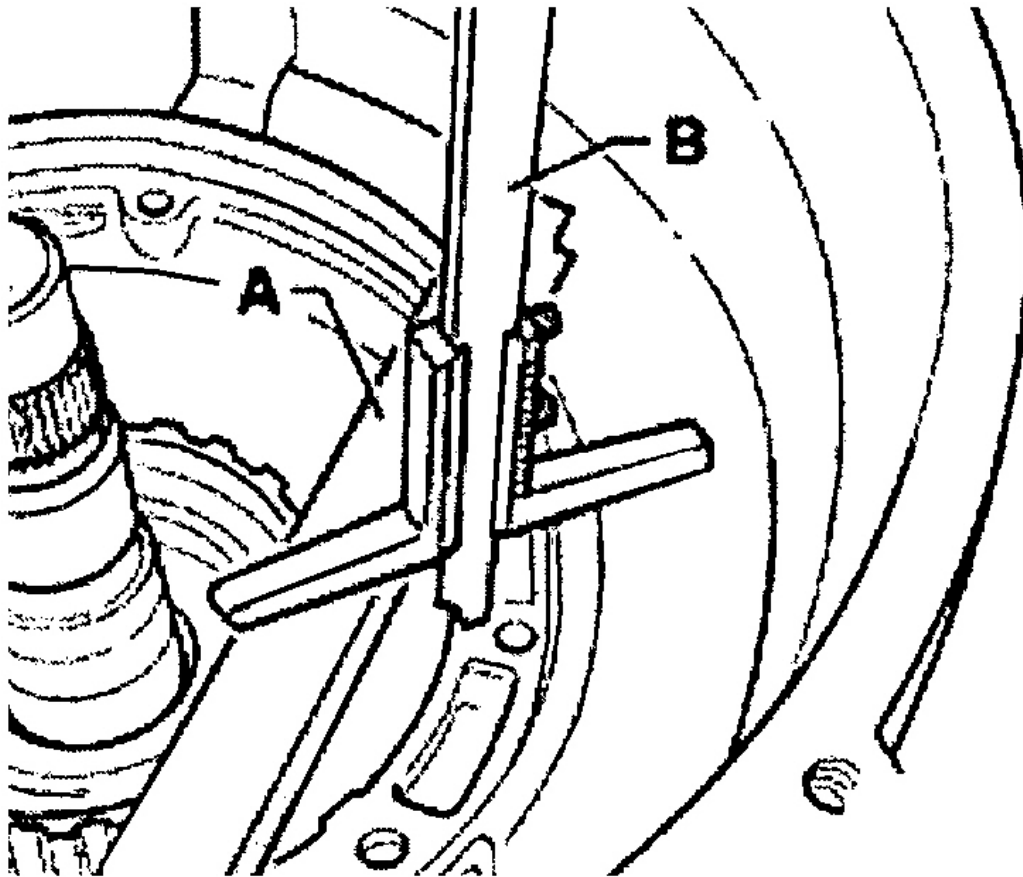
G00387953

Fig. 102: Placing Straightedge "A" Onto Transmission Housing (-K1- & -K2-)
Courtesy of VOLKSWAGEN UNITED STATES, INC.

Press -K1- together with -K3- down in direction of arrow and measure distance into -K1- with depth gauge "B".

Example: Reading 1 = 88.5 mm

Measure with depth gauge "B" to pump flange on transmission housing. See **Fig. 103** .



G00387954

Fig. 103: Calculating "a" (-K1- & -K2-)

Courtesy of VOLKSWAGEN UNITED STATES, INC.

Example: Reading 2 = 34.3 mm

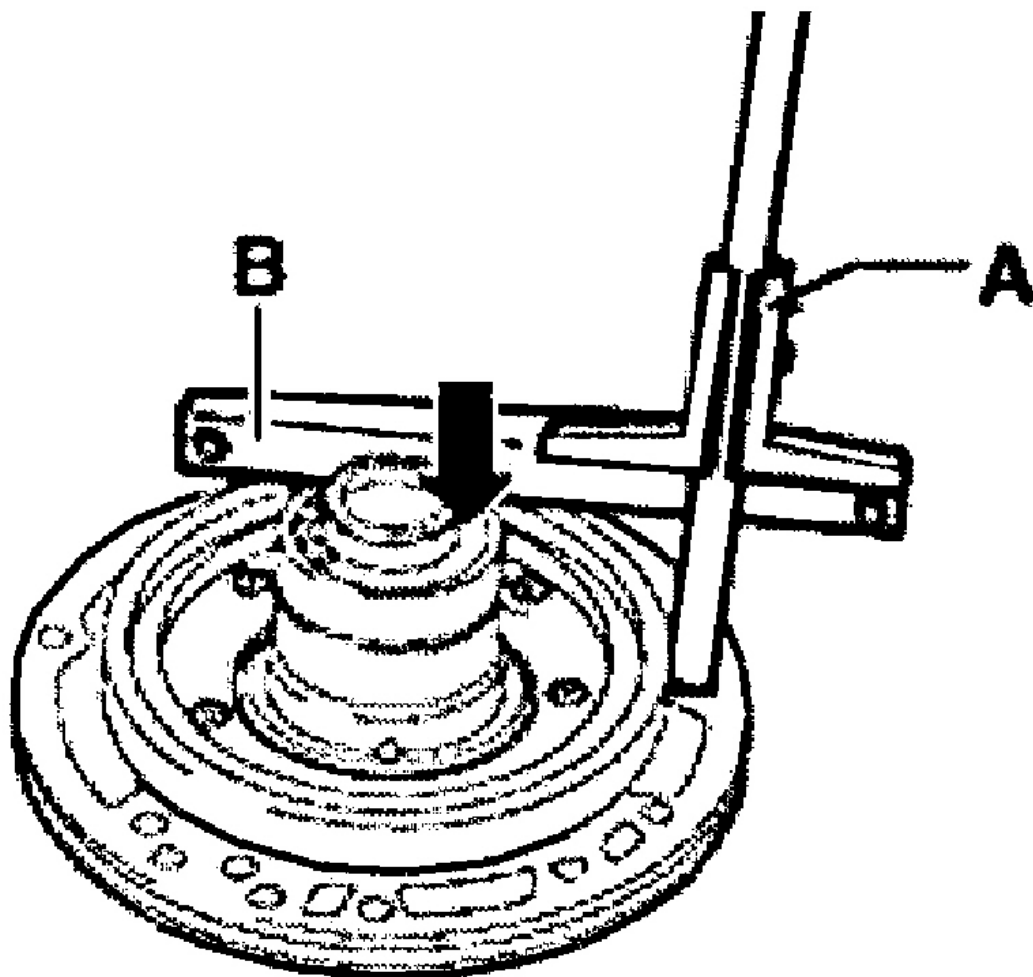
- "start" Reading 1 = 88.5 mm
- "minus" Reading 2 = 34.3 mm
- "equals" Calculated size a = 54.2 mm

Size measured from pump flange/transmission housing into -K1-.

Calculating "b" (-K1- & -K2-)

Place new paper gasket onto ATF pump.

Place straightedge -B- onto stator support (arrow) and measure with depth gauge -A- to gasket of pump flange. See **Fig. 104** .



G00389897

Fig. 104: Calculating "b" (-K1- & -K2-)
Courtesy of VOLKSWAGEN UNITED STATES, INC.

Example calculation:

- "start" Reading = 70.5 mm
- "minus" Straightedge = 19.5 mm
- "equals" Calculated size b = 51.0 mm

Gap x = a - b

Gap = 54.2 mm - 51.0 mm = 3.2 mm

Determine size of shim according to table. See **CLUTCH PLAY BETWEEN -K1- AND -K2- SHIMS** .

Calculate thickness of shims according to table and determine Part No. from parts catalog.

Carry out **Check Measurement (Clutch Play)** after installing ATF pump.

Table Of Shims (-K1- & -K2-)

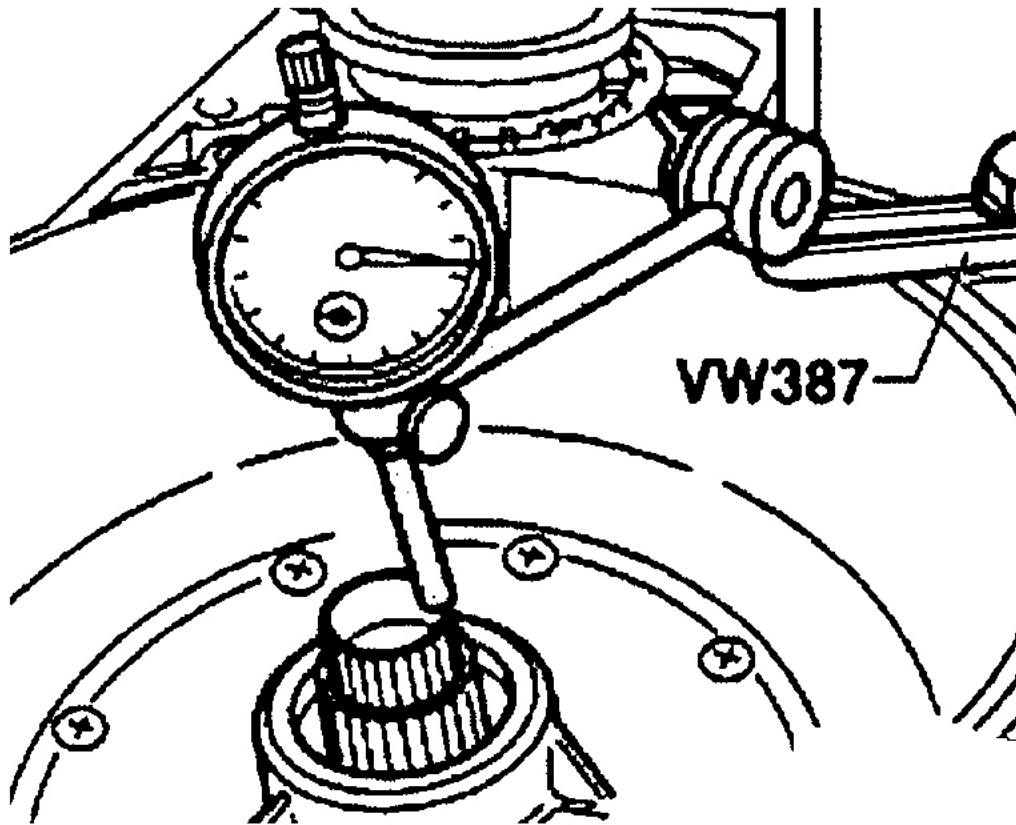
CLUTCH PLAY BETWEEN -K1- AND -K2- SHIMS

Gap "x" (mm)	Shims (mm)
0-2.54	1.4
2.55-3.09	1 + 1
3.10-3.49	1.2 + 1.2
3.50-3.89	1.4 + 1.4
3.90-4.29	1.6 + 1.6
4.30-4.69	1.8 + 1.8
4.70-5.04	1.2 + 1.2 + 1.6
5.05-5.25	1.2 + 1.2 + 1.8

Check Measurement (Clutch Play)

The clutch play cannot be measured until the ATF pump has been installed.

Attach dial gauge holder to transmission housing and place dial gauge on turbine shaft with a preload of 1 mm.
See **Fig. 105** .



G00389898

Fig. 105: Check Clutch Play Measurement
Courtesy of VOLKSWAGEN UNITED STATES, INC.

Move turbine shaft up and down and read of play on dial gauge.

Play: Min. = 0.5 mm.; Max. = 1.2 mm

2ND AND 4TH GEAR BRAKE -B2-, ADJUSTMENT

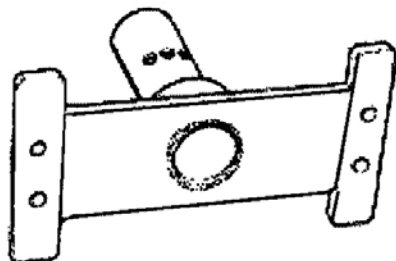
Number of inner and outer plates varies based on transmission code. For correct number used, see **CODE LETTERS, TRANSMISSION APPLICATION, RATIOS, EQUIPMENT** .

Special Tools And Equipment

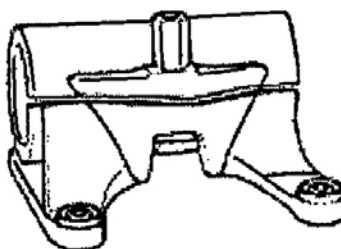
- VW 309 Holding plate
- VW 313 Support clamp

- VW 353 Transmission support
- 3459 Adjustment tool
- Depth gauge
- Straightedge

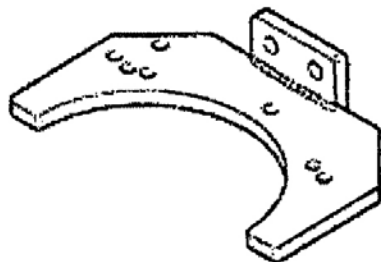
VW 309



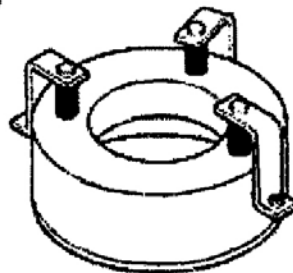
VW 313



VW 353



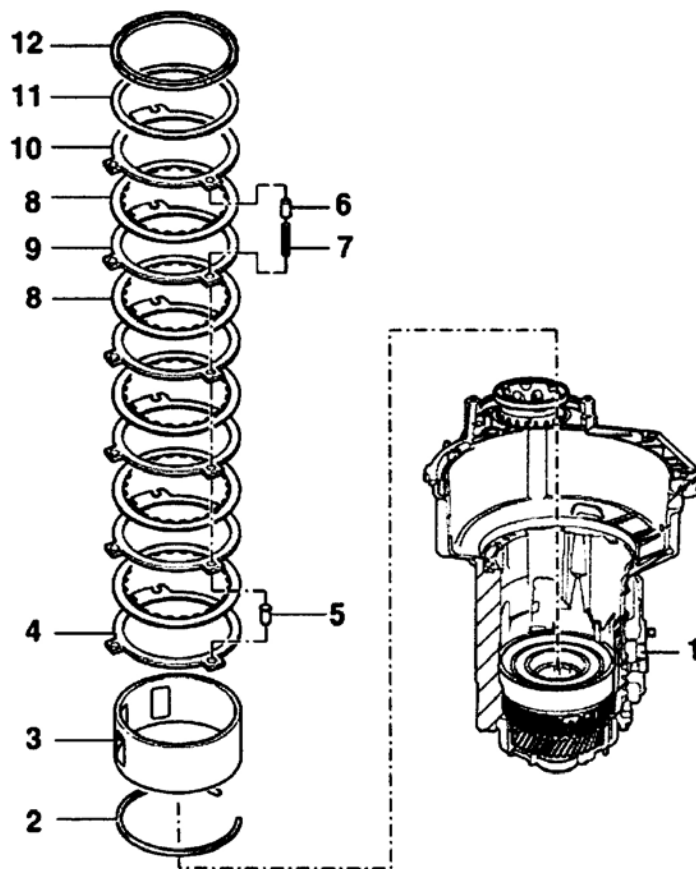
3459



G00389899

Fig. 106: 2nd & 4th Gear Brake Adjusting Special Tools
 Courtesy of VOLKSWAGEN UNITED STATES, INC.

NOTE: To adjust, install components without shim (item -11-), without last outer plate (item -10-) and without spring caps (item 6). See Fig. 107 .



1 - Transmission housing

2 - Circlip

- ◆ For supporting tube

3 - Supporting tube -B2-

- ◆ Replacement part is assigned according to transmission code letters
- ◆ Insert so that notch locates on freewheel wedge

4 - Outer plate -B2-

- ◆ 3 mm thick

5 - Spring cap

- ◆ Install after installing first outer plate (item - 4 -)

6 - Spring cap

- ◆ Do not install when adjusting -B2-
- ◆ Install before installing last outer plate

7 - Spring

- ◆ Replacement part is assigned according to transmission code letters

8 - Inner plate -B2-

- ◆ Replacement part is assigned according to transmission code letters

9 - Outer plate -B2-

- ◆ Always install 2 mm thick outer plates

10 - Outer plate -B2-

- ◆ 3 mm thick
- ◆ Do not install when adjusting -B2-

11 - Shim

- ◆ Do not install when adjusting -B2-

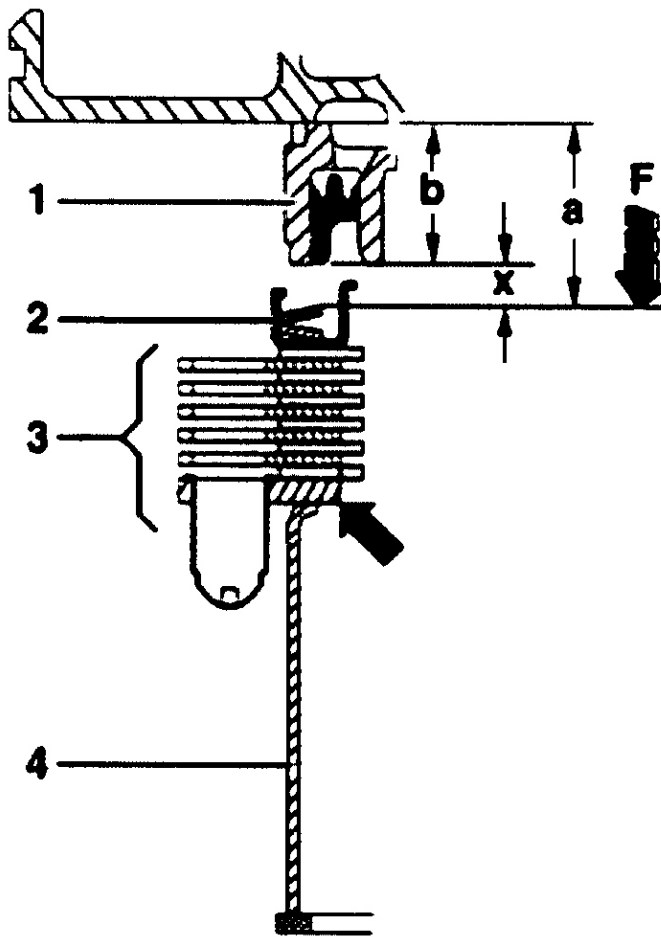
12 - Retaining ring

- ◆ Inserted with smooth side facing last inner plate (item - 8 -) when adjusting -B2-

G00389900

Fig. 107: Overview Of 2nd & 4th Gear Brake
Courtesy of VOLKSWAGEN UNITED STATES, INC.

The thickness of the shim(s) is determined by gap x . See **Fig. 108** . For this the formula (Gap $x = a - b - 2.65$ mm) must be used. The measuring points are shown in the illustration to help understanding the formula. Special tool 3459, which exerts a force $-F-$ onto the plate packet via the retaining ring, is not illustrated.



- 1 - ATF pump
- 2 - Retaining ring
- 3 - Plates for -B2- without last outer plate
- 4 - Supporting tube

Fig. 108: Determining 2nd & 4th Gear Brake Shims
Courtesy of VOLKSWAGEN UNITED STATES, INC.

Determining dimension a: See **Calculating Dimension "a":** .

Determining dimension b: See **Calculating Dimension "b":** .

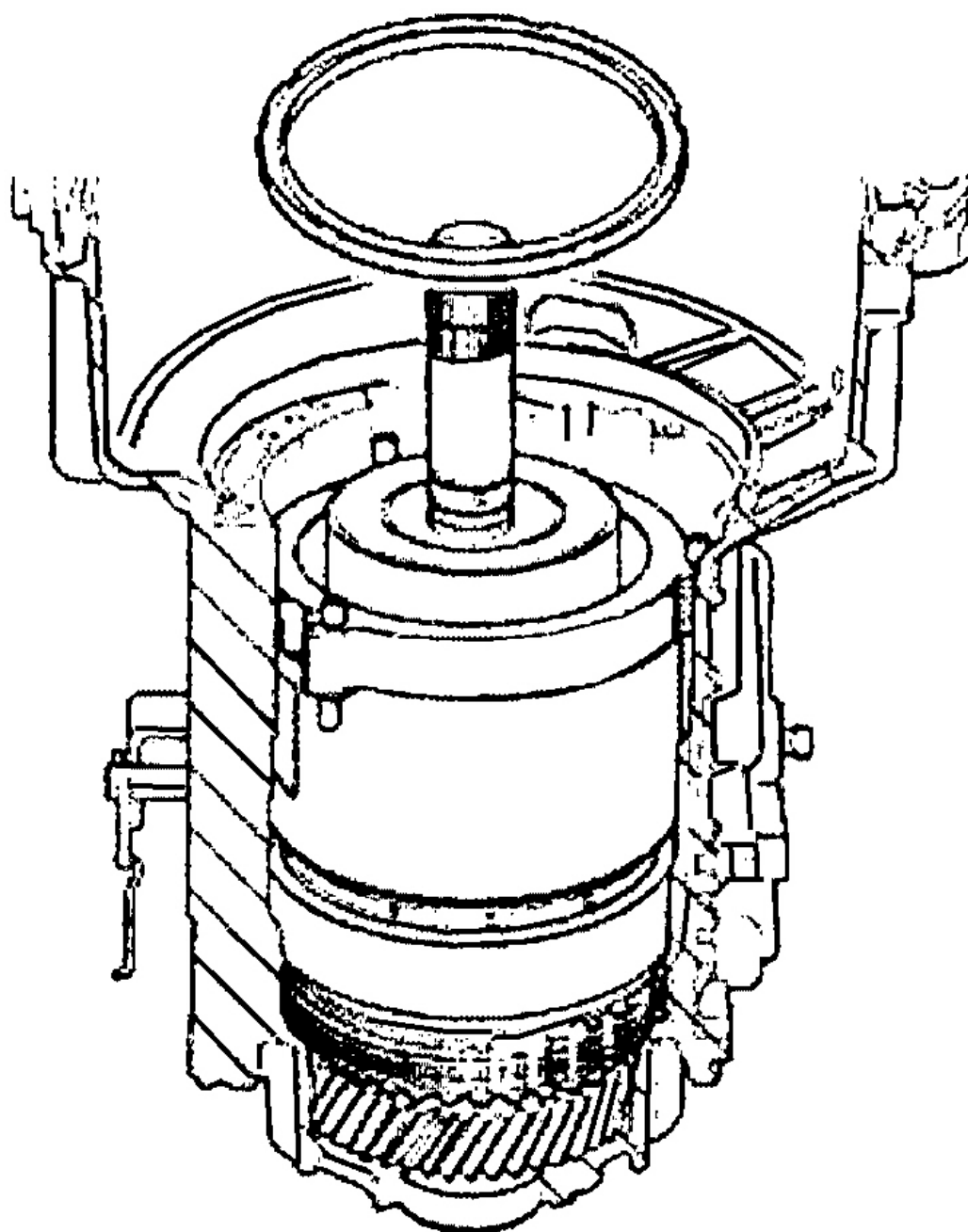
2.65 mm: The amount for settling is taken into account by force F.

NOTE: **First outer plate -arrow- and last outer plate (do not install to measure!) are always 3 mm thick.**

Calculating Dimension "a" (2nd & 4th Gear Brake)

Assemble transmission up to the last -B2- inner plate. See **Assembling Transmission** . The last outer plate and shim are not installed.

Place retaining ring with smooth side onto last inner plate. See **Fig. 109** .



G00389902

Fig. 109: Calculating Dimension "a" For 2nd & 4th Gear
Courtesy of VOLKSWAGEN UNITED STATES, INC.

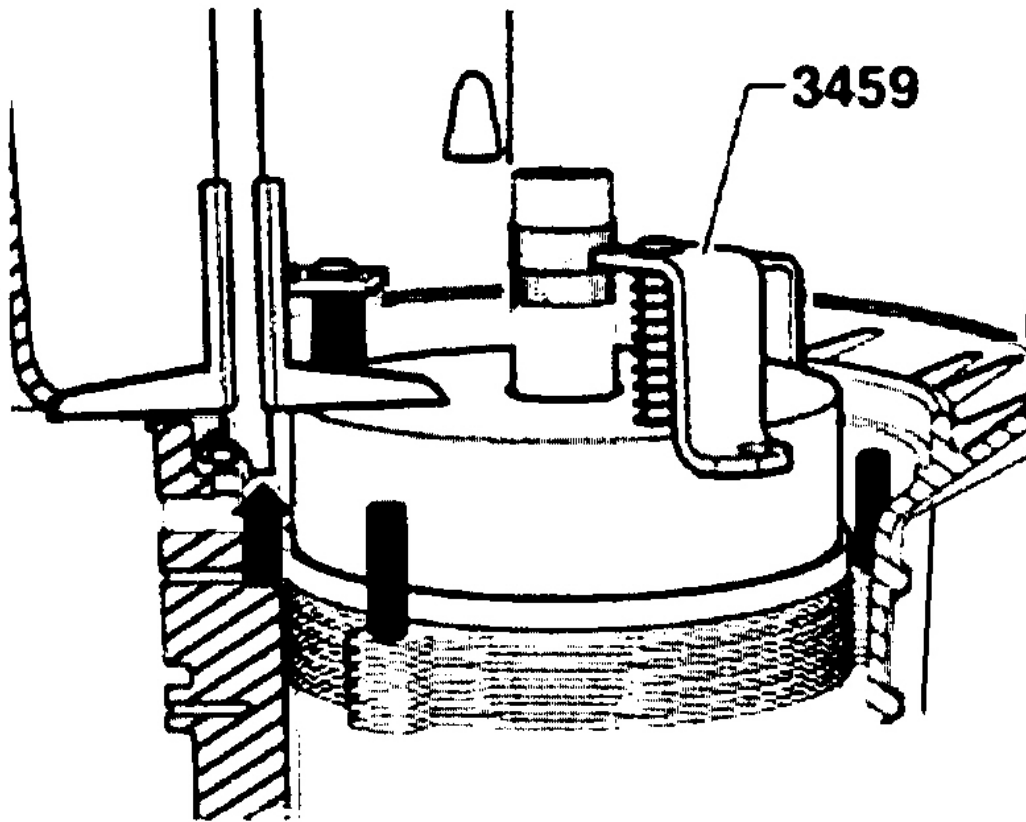
Place retaining ring with smooth side onto last inner plate.

Place 3459 onto retaining ring and turn so that 3 clips align with 3 holes for ATF pump.

Bolt 3459 to flange for ATF pump with 5 Nm.

The plate packet for -B2- is now pressed together for the measurements.

Measure from pump flange/transmission housing -arrow- to 3459 with depth gauge. See **Fig. 110** .



G00389903

Fig. 110: Measuring From Pump Flange-To-Transmission Housing
Courtesy of VOLKSWAGEN UNITED STATES, INC.

Dimension a = Height of 3459 in mm - measured value

Example calculation:

- "start" Height of 3459 = 60.0 mm

- "minus" Measured value = 32.7 mm
- "equals" Calculated value a = 27.3 mm

Note calculated value a.

Remove 3459.

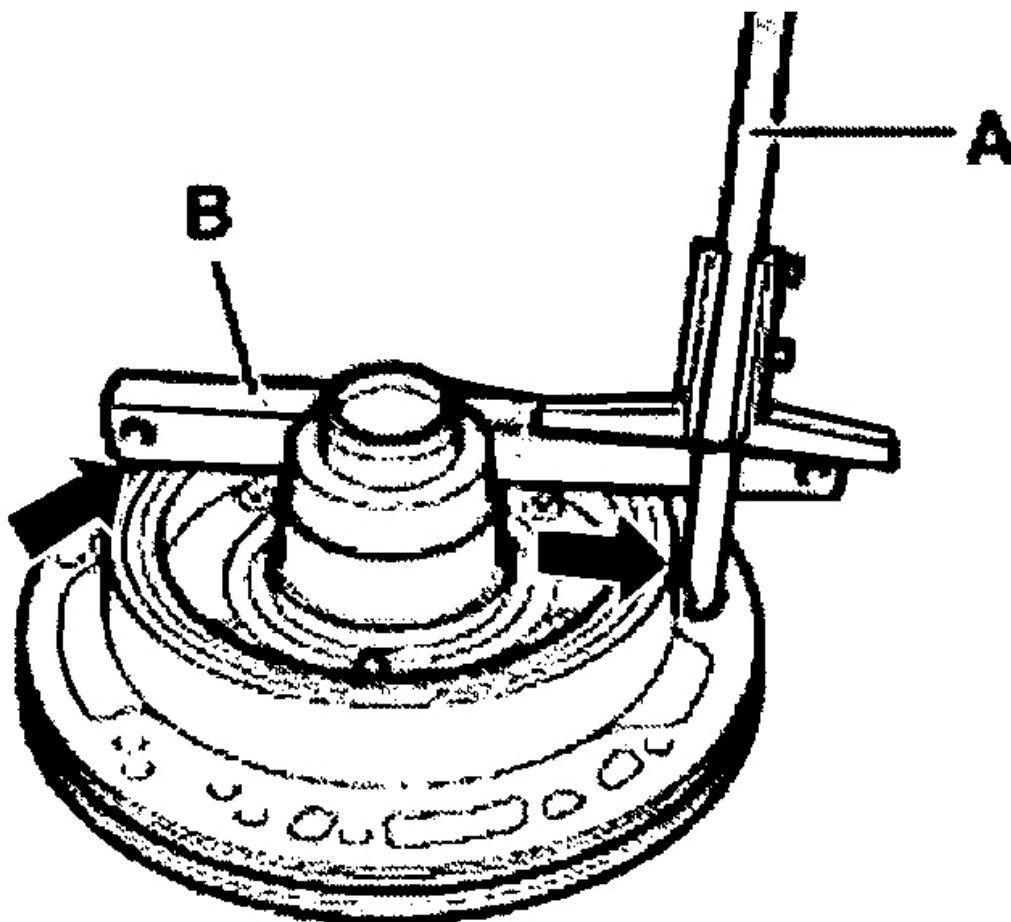
Remove retaining ring.

Calculating Dimension "b" (2nd & 4th Gear Brake)

Push piston into ATF pump onto stop.

Place new paper gasket onto ATF pump.

Place straightedge "B" onto stator support (arrow) and measure with depth gauge "A" to gasket of pump flange.
See **Fig. 111** .



G00389904

Fig. 111: Calculating Dimension "b" (2nd & 4th Gear Brake)
Courtesy of VOLKSWAGEN UNITED STATES, INC.

Example calculation:

- "start" Measured value = 39.8 mm
- "minus" Straightedge = 19.5 mm
- "equals" Calculated value $b = 20.3$ mm

Note calculated value b .

Gap $x = a - b - 2.65$ mm

$$\text{Gap } x = 27.3 - 20.3 - 2.65 \text{ mm} = 4.35 \text{ mm}$$

Determine size of shim(s) according to table: See **2ND & 4th Gear Brake Shims** .

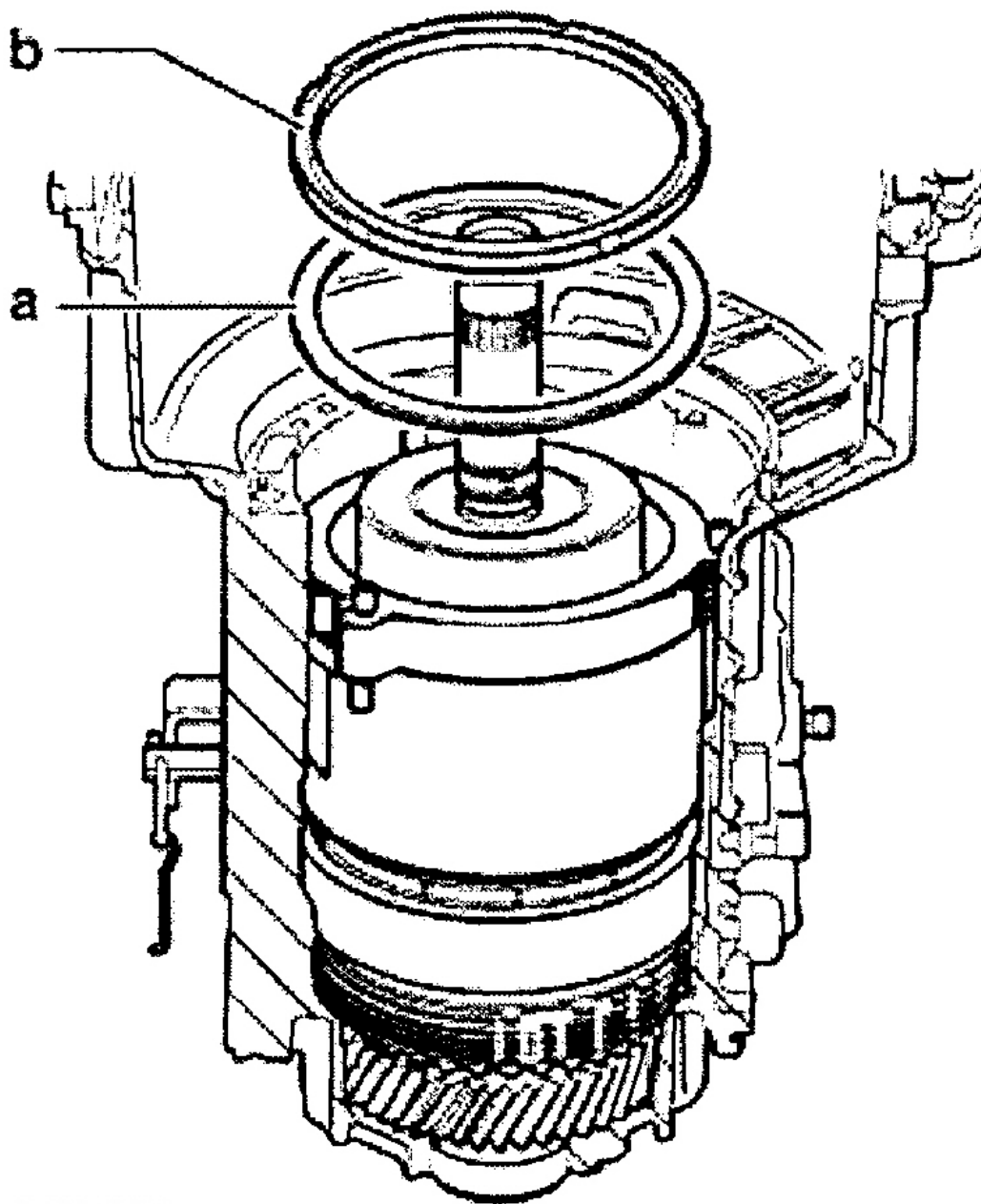
Calculate thickness of shim(s) according to table and determine Part No. from parts catalog.

In this example two shims must be installed (each 1.00 mm thick).

Insert three spring caps onto compression springs.

Insert last outer plate (3 mm thick).

Install correct shim(s) -a-. See **Fig. 112** .



G00389905

Fig. 112: Installing Shim & Retaining Ring (2nd & 4th Gear Brake)
Courtesy of VOLKSWAGEN UNITED STATES, INC.

Place retaining ring -b- onto shim(s). Smooth side facing shim.

Further installation instructions are described in Assembling Transmission.

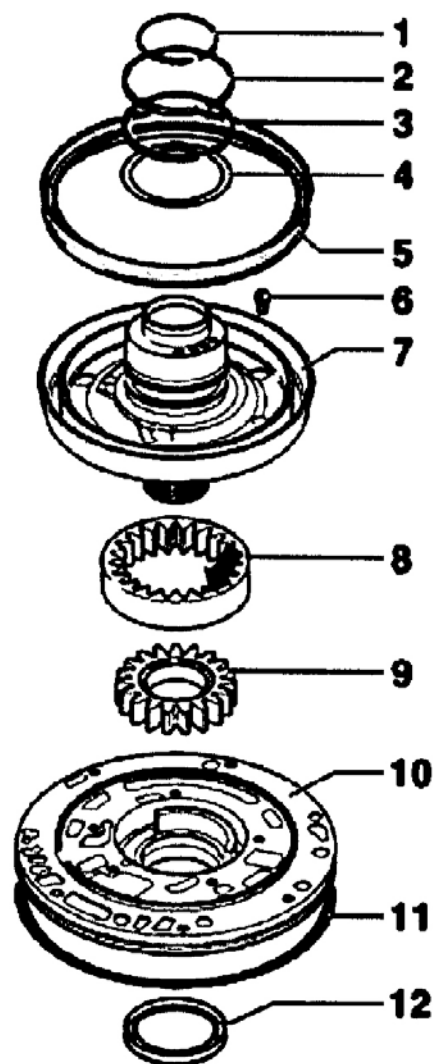
Table Of Shims (2nd & 4th Gear Brake)

2ND & 4TH GEAR BRAKE SHIMS

Gap "x" (mm)	Shims (mm)
3.25-3.50	1.00
3.51-3.75	1.25
3.76-4.00	1.50
4.01-4.25	1.75
4.26-4.50	1.00 + 1.00
4.51-4.75	1.00 + 1.25
4.76-5.00	1.25 + 1.25
5.01-5.25	1.25 + 1.50
5.26-5.50	1.50 + 1.50
5.51-5.75	1.50 + 1.75
5.76-6.00	1.75 + 7.75

ATF PUMP

Replacement ATF pump parts and the ATF pump are assigned according to transmission code.



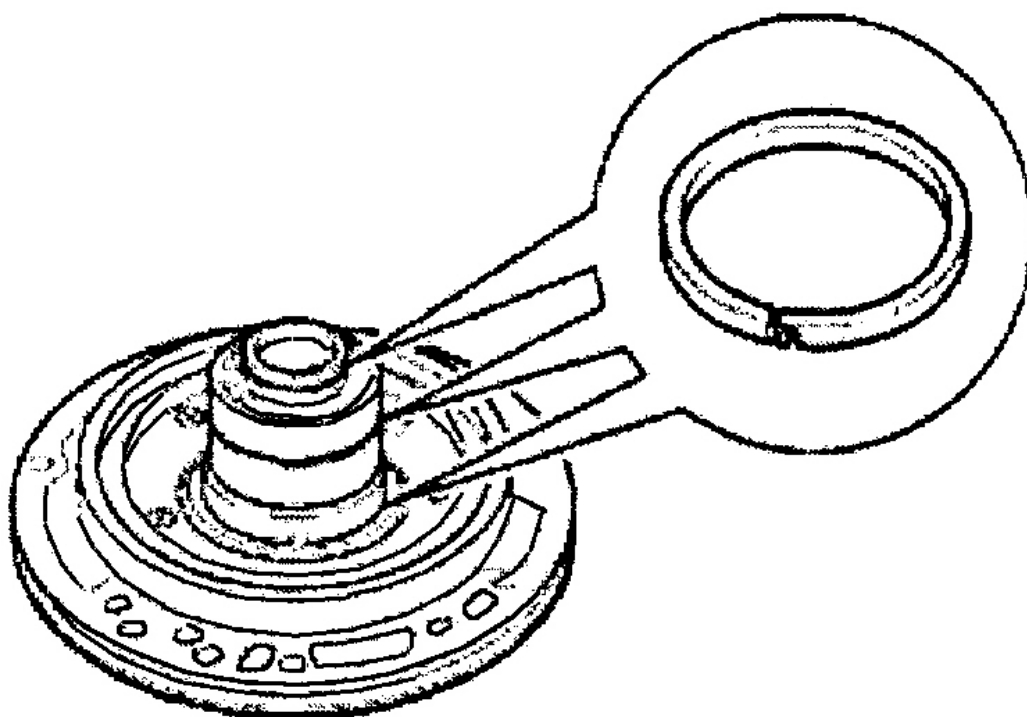
- 1 - Piston ring
- 2 - Piston ring
- 3 - Piston ring
- 4 - Thrust washer
- 5 - Piston
 - ◆ Sealing lips are vulcanized to the piston
 - ◆ Moisten sealing lips with ATF before inserting
 - ◆ Turn piston slightly when installing
- 6 - Bolt, 10 Nm
 - ◆ Then turn 45° further
- 7 - Stator support
- 8 - Outer gear
 - ◆ Manufacturer's marking (arrow) faces stator support
 - ◆ If outer gear is incorrectly installed, ATF pump may not operate freely in installed position
- 9 - Inner gear
 - ◆ Larger groove faces stator support
- 10 - Housing for ATF pump
- 11 - O-ring
 - ◆ Always replace
- 12 - Torque converter oil seal

G00389906

Fig. 113: Exploded View Of ATF Pump
 Courtesy of VOLKSWAGEN UNITED STATES, INC.

Disassembling And Assembling

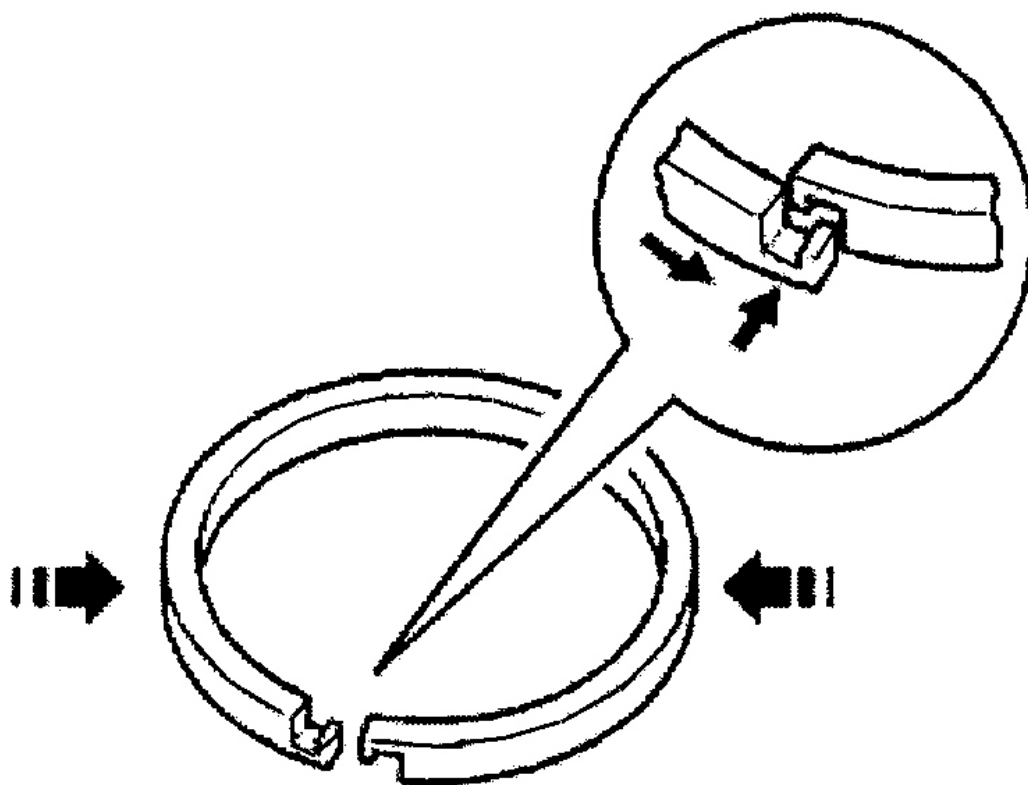
Make sure that ends of piston rings are hooked together. See **Fig. 114** .



G00389907

Fig. 114: Checking ATF Pump Piston Rings Are Located Correctly
Courtesy of VOLKSWAGEN UNITED STATES, INC.

Place piston ring in groove. See **Fig. 115** .



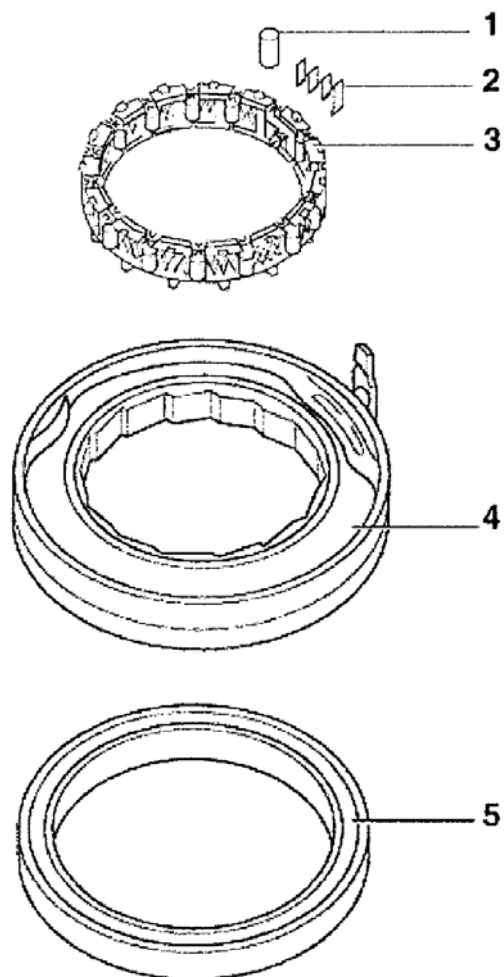
G00389908

Fig. 115: Installing ATF Pump Piston Rings
Courtesy of VOLKSWAGEN UNITED STATES, INC.

Hook ends together by pressing sides of ring in and guiding ends over one another.

NOTE: Do not twist piston ring out of groove on one side.

FREEWHEEL WITH -B1- PISTON



1 - Rollers

2 - Springs

3 - Cage

4 - Outer ring

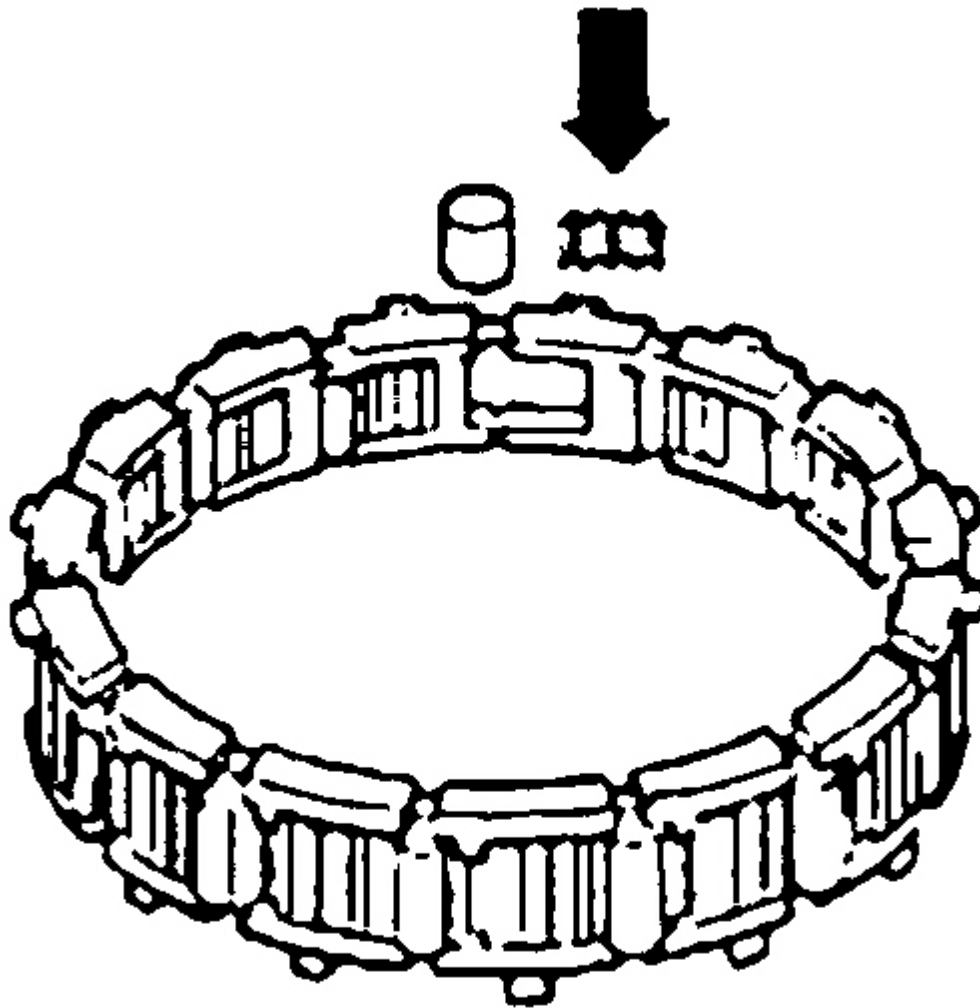
5 - Piston

- ◆ Sealing lips are vulcanized to the piston
- ◆ Moisten sealing lips with ATF before installing
- ◆ Turn piston slightly when installing

G00389909

Fig. 116: Identifying Freewheel W/Piston Components
Courtesy of VOLKSWAGEN UNITED STATES, INC.

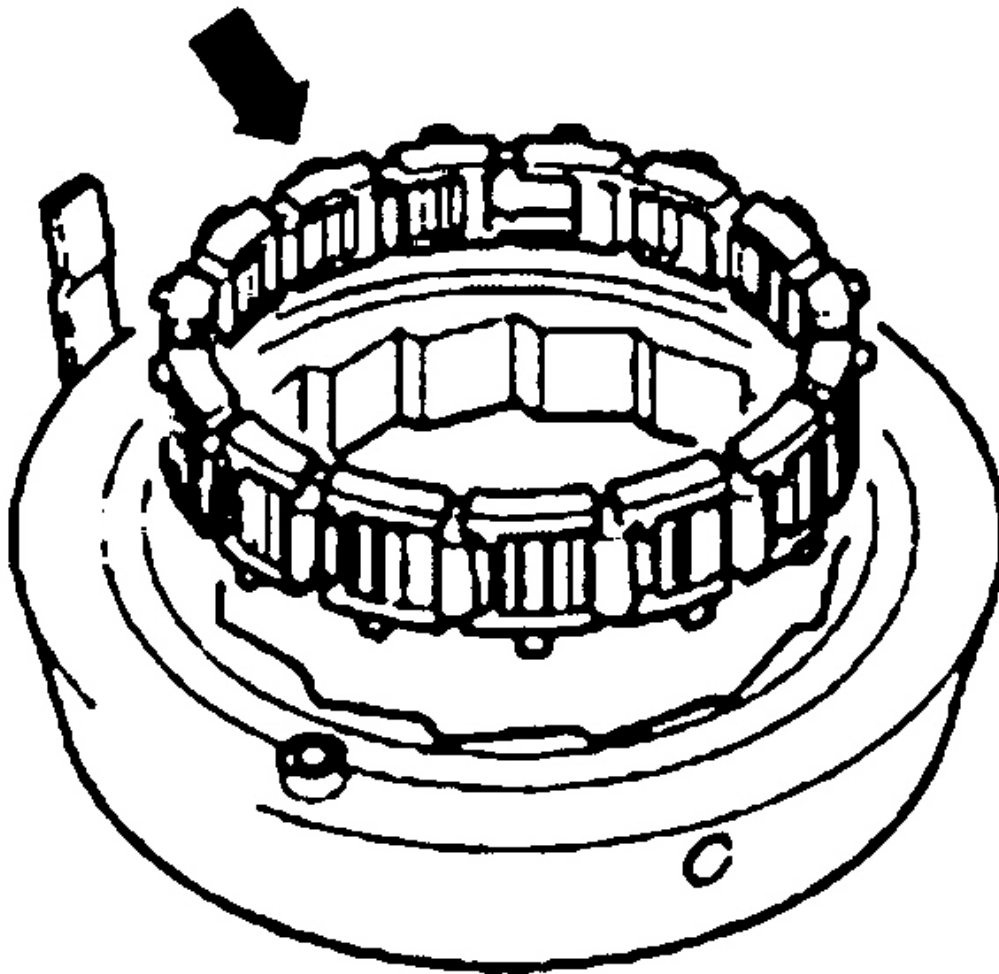
Insert springs so that spring (arrow) engages in cage. See **Fig. 117** .



G00389910

Fig. 117: Installing Rollers & Springs (-B1- Piston)
Courtesy of VOLKSWAGEN UNITED STATES, INC.

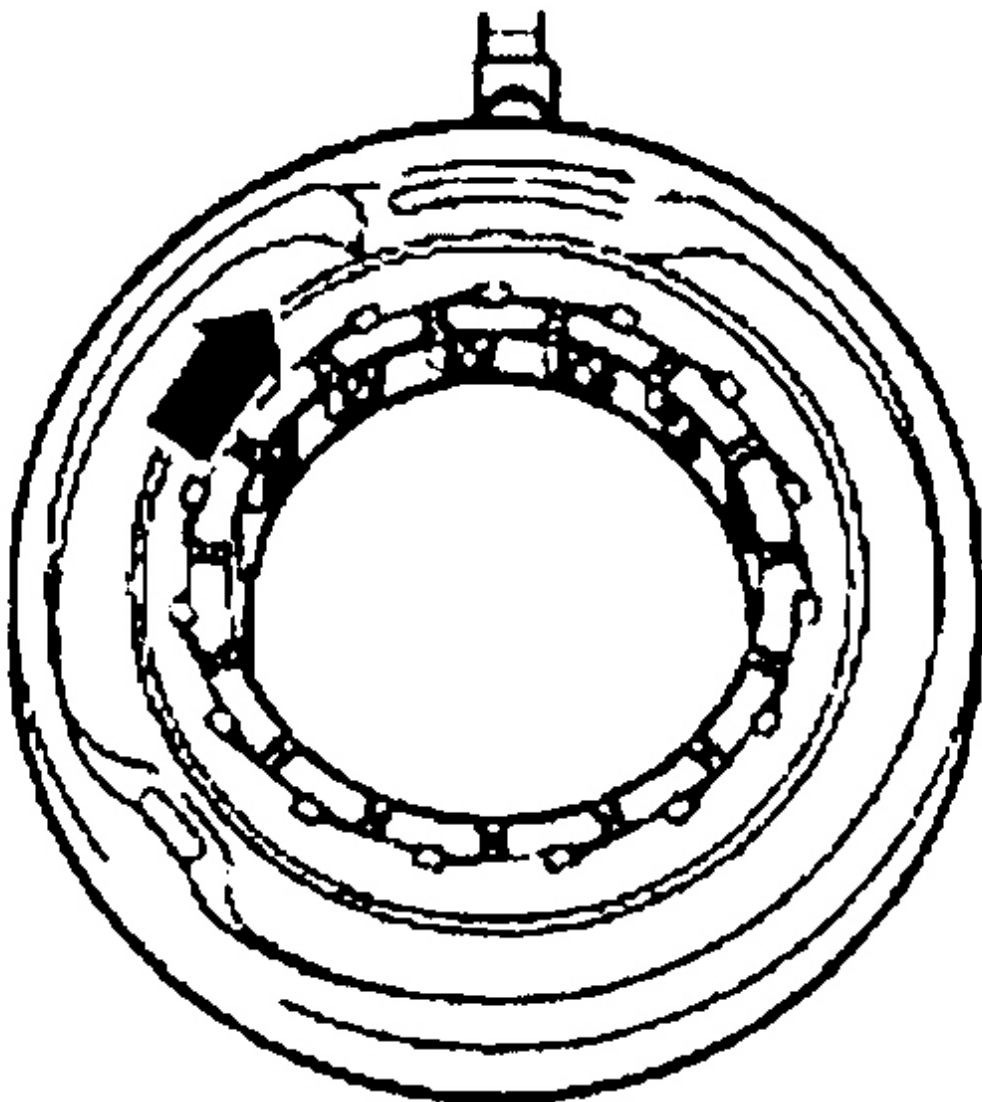
Install with large lugs (arrow) facing up. See **Fig. 118** .



G00389911

Fig. 118: Inserting Cage W/Springs & Rollers (-B1- Piston)
Courtesy of VOLKSWAGEN UNITED STATES, INC.

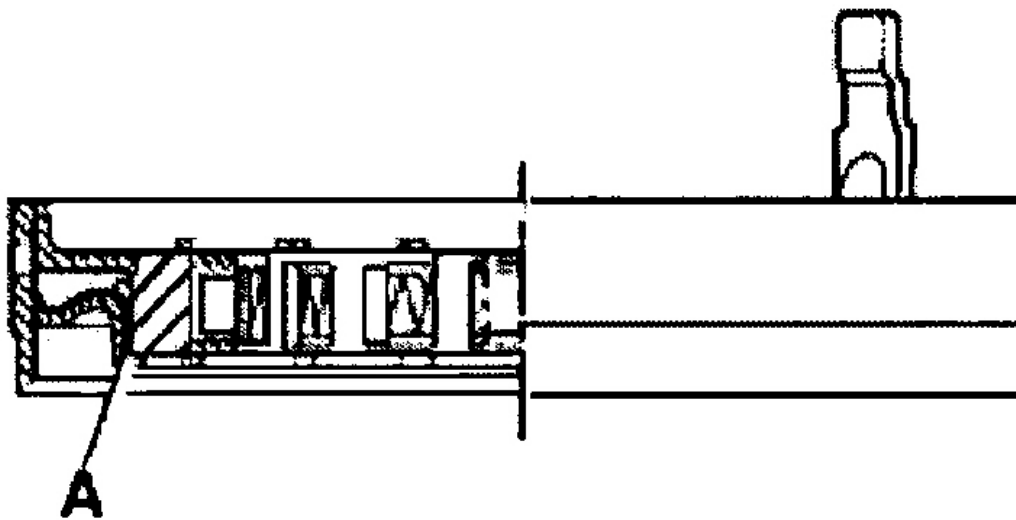
Secure cage by turning in direction of arrow as far as stop. See **Fig. 119** .



G00389912

Fig. 119: Securing Cage (-B1- Piston)
Courtesy of VOLKSWAGEN UNITED STATES, INC.

Insert piston -A- as shown. See Fig. 120 .



G00389913

Fig. 120: Identifying Installation Position Of Piston (-B1- Piston)
Courtesy of VOLKSWAGEN UNITED STATES, INC.

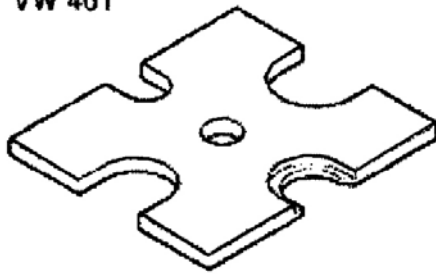
1ST TO 3RD GEAR CLUTCH -K1-

Number of inner and outer plates varies based on transmission code. For correct number used, see **CODE LETTERS, TRANSMISSION APPLICATION, RATIOS, EQUIPMENT** .

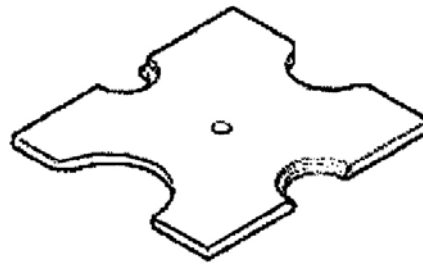
Special Tools And Equipment

- VW 401 Thrust plate
- VW 402 Thrust plate
- VW 412 Press tool
- VW 442 Thrust pad
- 40-203/ 1 Tube, split

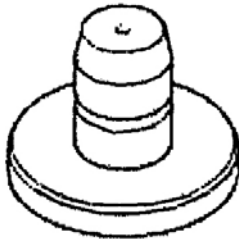
VW 401



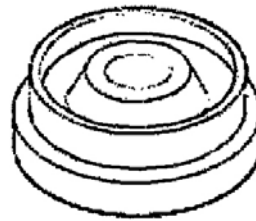
VW 402



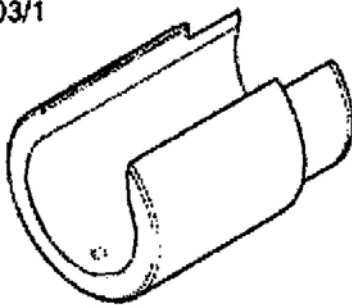
VW 412



VW 442



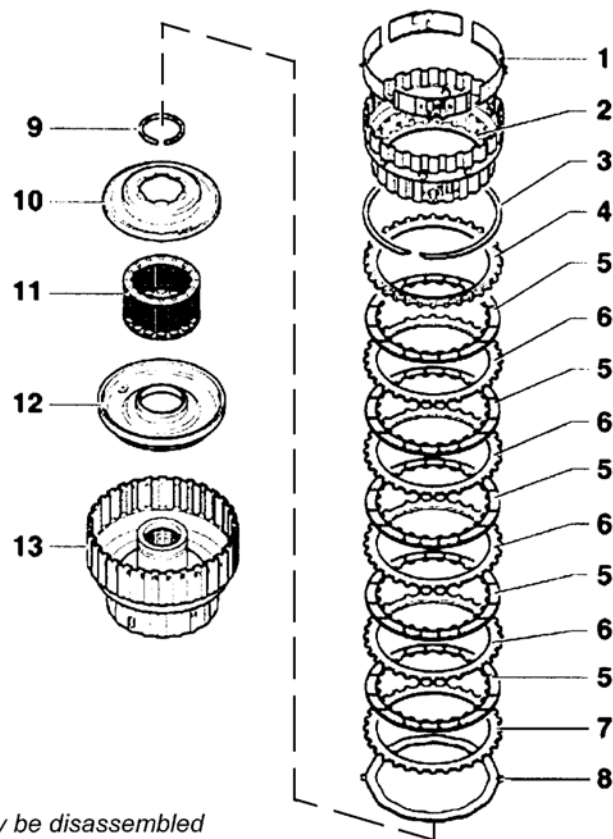
40-203/1



G00389914

Fig. 121: Identifying 1st-3rd Gear Clutch Special Tools
Courtesy of VOLKSWAGEN UNITED STATES, INC.

Disassembling And Assembling



Note:

The clutch should only be disassembled for cleaning or to visually check parts.

The clutches -K1- and -K3- are pressed together.

1 - Supporting ring

- ◆ 4-piece, unclip from inner plate carrier

2 - Inner plate carrier

3 - Circlip

- ◆ Different thicknesses
- ◆ Mark after removing and insert in same position

4 - Thrust plate

- ◆ Smooth side faces inner plate

5 - Inner plate

6 - Outer plate

- ◆ Always 1.5 mm thick

7 - Outer plate

- ◆ Always 2 mm thick

8 - Corrugated washer

9 - Circlip

10 - Piston cap

- ◆ Sealing lips are vulcanized to cap
- ◆ Moisten sealing lips with ATF before installing
- ◆ Turn cap slightly when installing

11 - Intermediate spring ring

- ◆ With spring supporting shell and compression springs

12 - Piston

- ◆ Sealing lips are vulcanized to piston
- ◆ Moisten sealing lips with ATF before installing
- ◆ Turn piston slightly when installing

13 - Clutch housing

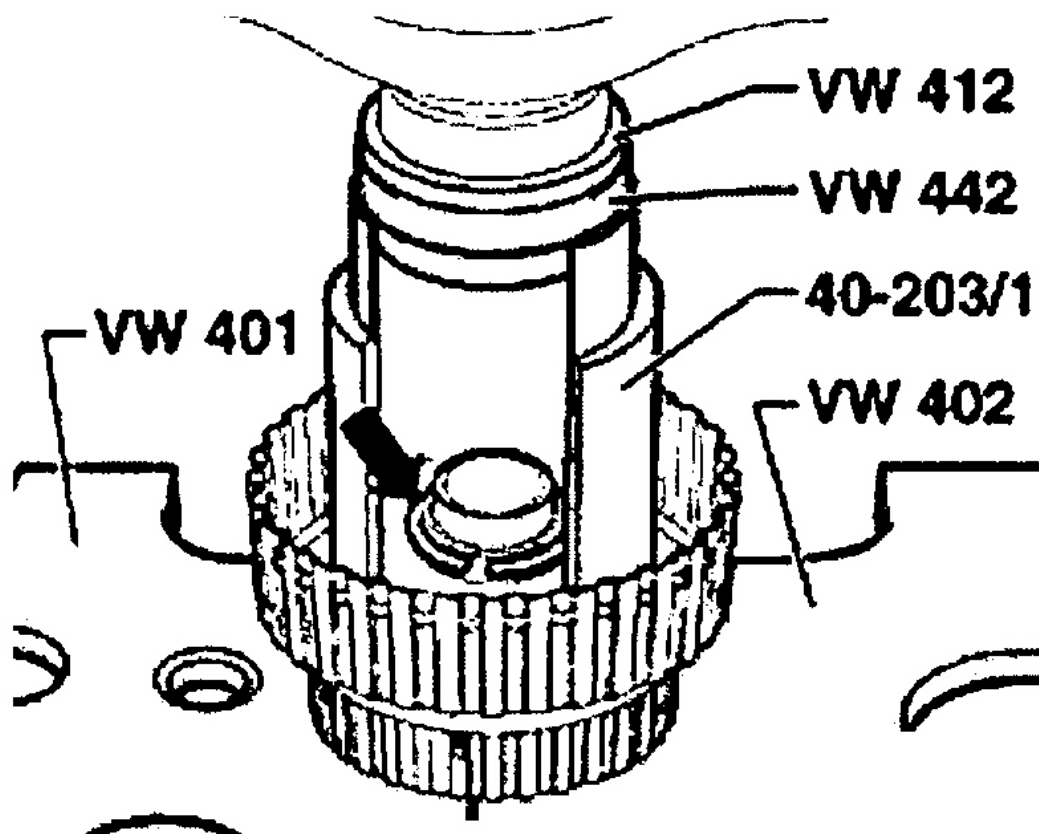
- ◆ Before inserting the inner plate carrier corrugated washer (item -8-), insert inner and outer plates in clutch

G00389915

Fig. 122: Identifying 1st-3rd Gear Clutch Components

Courtesy of VOLKSWAGEN UNITED STATES, INC.

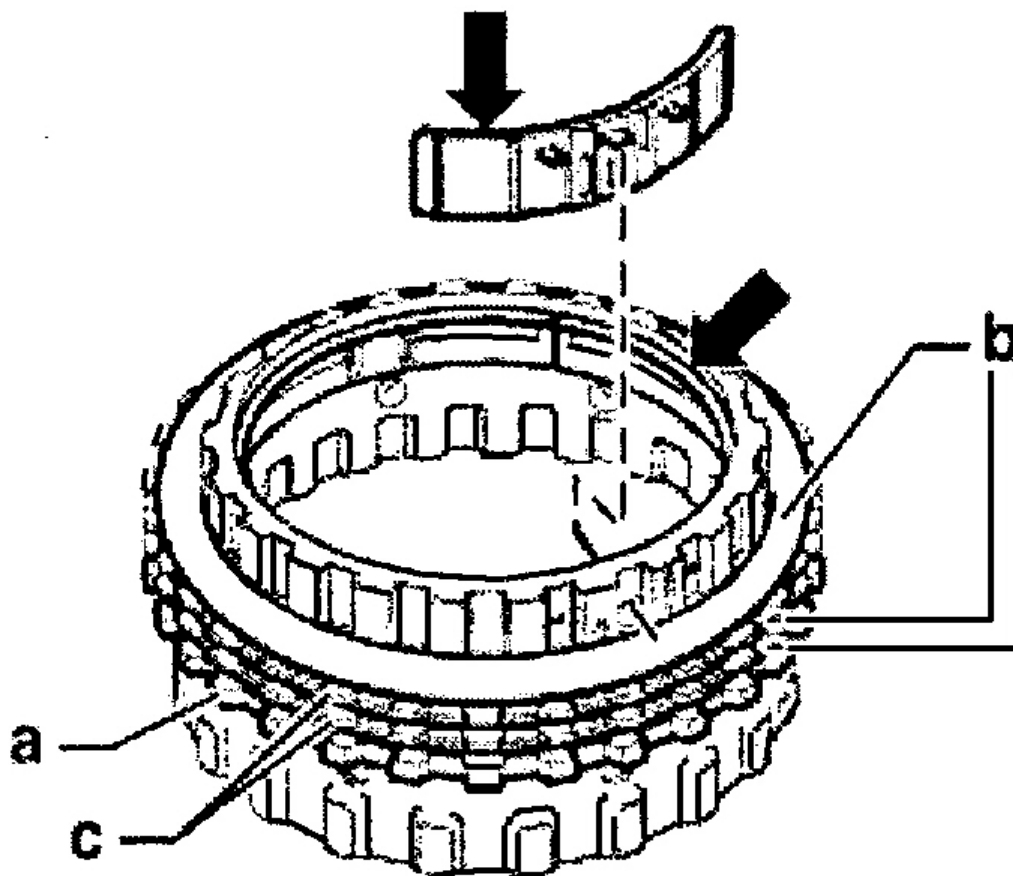
Press piston cap with intermediate spring ring down far enough for circlip (arrow) to be inserted in groove. See **Fig. 123** .



G00389916

Fig. 123: Removing & Installing Circlip (1st-3rd Gear Clutch)
Courtesy of VOLKSWAGEN UNITED STATES, INC.

Install thrust plate -a- with smooth side facing inner plate and stepped side towards inner plate carrier. See **Fig. 124** .



G00389917

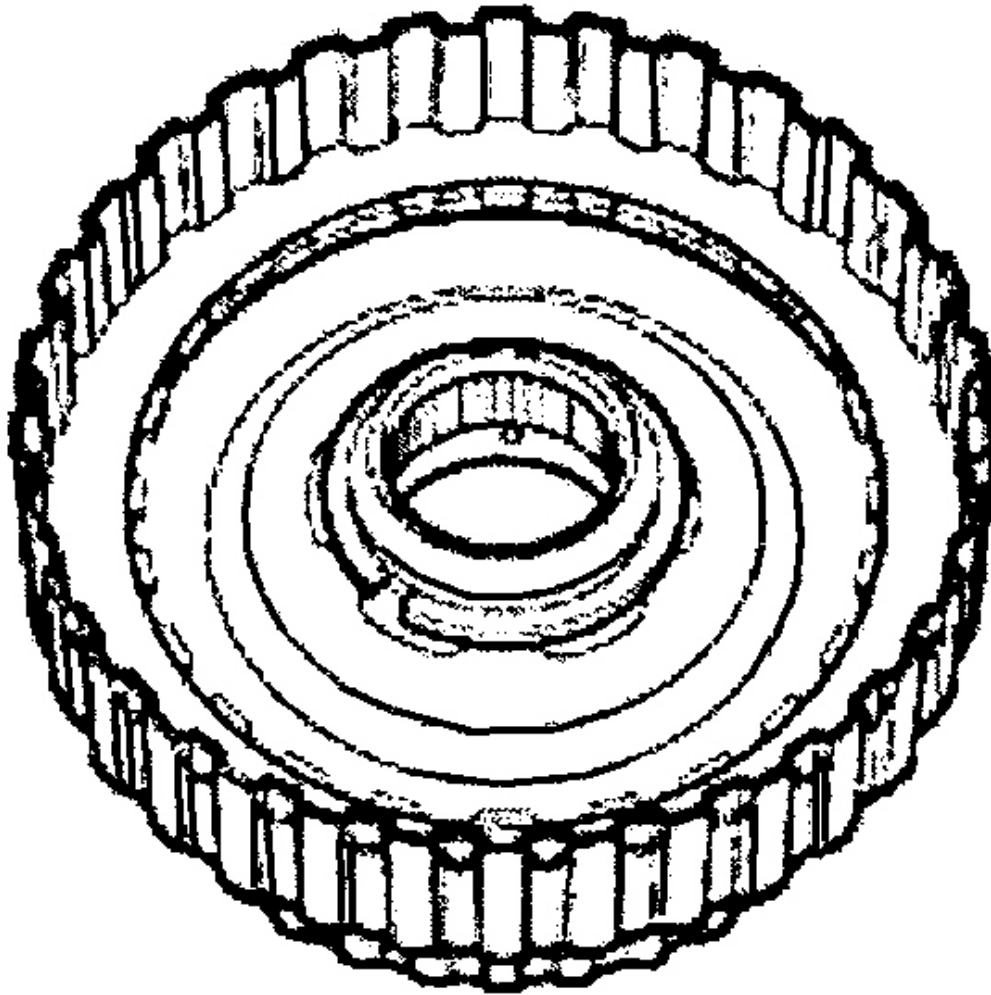
Fig. 124: Installing Thrust Plate & Plates Onto Inner Plate Carrier (1st-3rd Gear Clutch)
Courtesy of VOLKSWAGEN UNITED STATES, INC.

Install 3 inner plates -b- and 2 outer plates -c-.

Clip in supporting ring with step (arrow).

NOTE: **Locate locating lugs correctly.**

First insert corrugated washer. See **Fig. 125** .



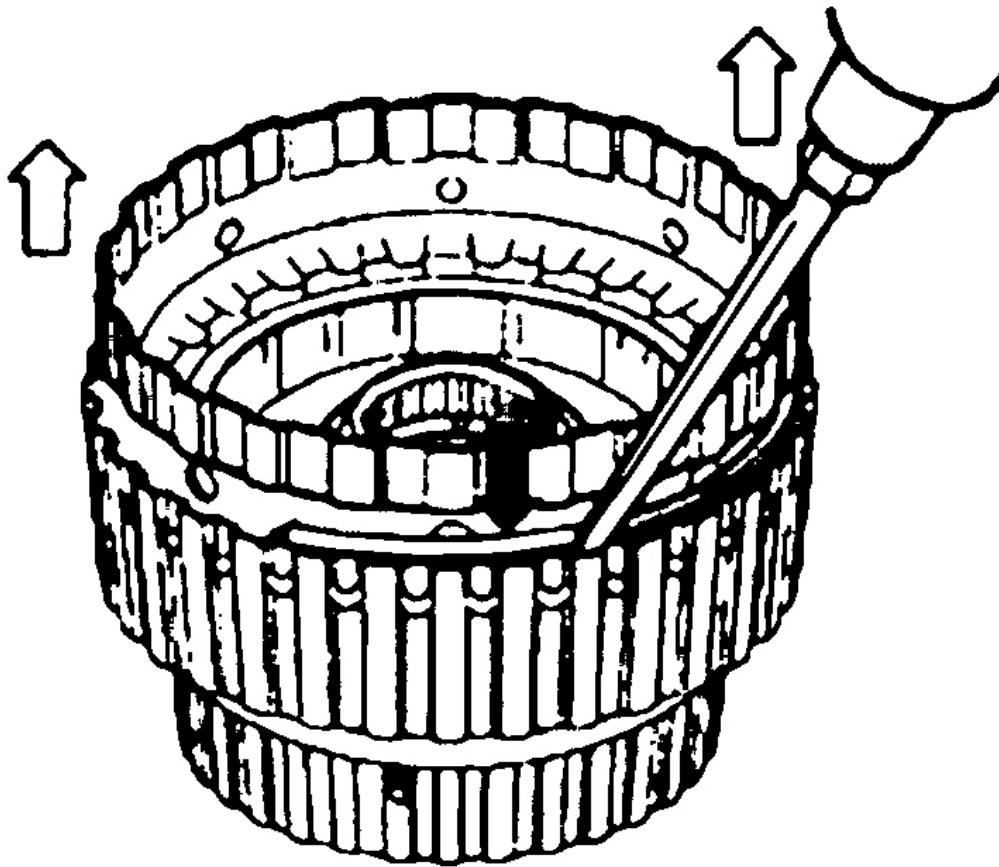
G00389918

Fig. 125: Installing Corrugated Washer & Inner & Outer Plates In Clutch Housing (1st-3rd Gear Clutch)
Courtesy of VOLKSWAGEN UNITED STATES, INC.

Insert 2 mm thick outer plate.

Insert remaining inner and outer plates.

Lift inner plate carrier slightly to install circlip (arrows). See **Fig. 126** .



G00389919

Fig. 126: Inserting Inner Plate Carrier & Installing Circlip (1st-3rd Gear Clutch)

Courtesy of VOLKSWAGEN UNITED STATES, INC.

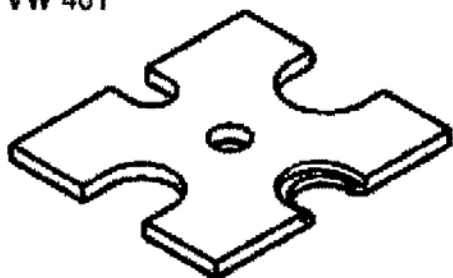
REVERSE GEAR CLUTCH -K2-

Number of inner and outer plates varies based on transmission code. For correct number used, see **CODE LETTERS, TRANSMISSION APPLICATION, RATIOS, EQUIPMENT** .

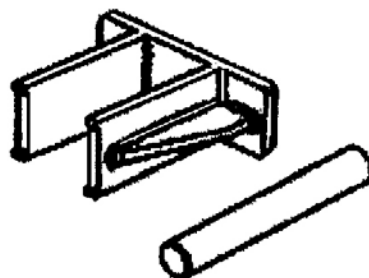
Special Tools And Equipment

- VW 401 Thrust plate
- VW 460 Removal device
- 3267 Assembly ring

VW 401



VW 460

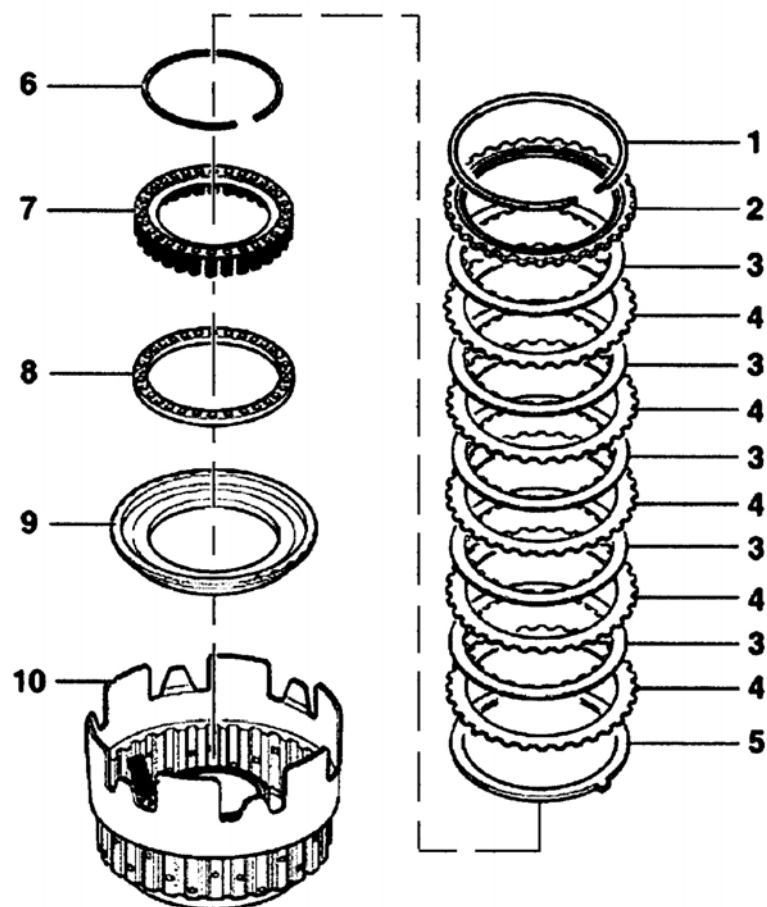


3267



G00389920

Fig. 127: Identifying Reverse Gear Clutch Special Tools
Courtesy of VOLKSWAGEN UNITED STATES, INC.



Note:

- ◆ The clutch should only be disassembled for cleaning or to visually check parts.
- ◆ When doing this ensure that the ball valve (arrow) is not damaged.

1 - Circlip

- ◆ Mark after removing and insert in same position

2 - Thrust plate

- ◆ Smooth side facing inner plates

3 - Inner plate

4 - Outer plate

5 - Corrugated washer

6 - Circlip

7 - Spring supporting plate

- ◆ With springs

8 - Spring supporting ring

9 - Piston

- ◆ Sealing lips are vulcanized to piston
- ◆ Moisten sealing lips with ATF before installing
- ◆ Turn piston slightly when installing

10 - Clutch housing

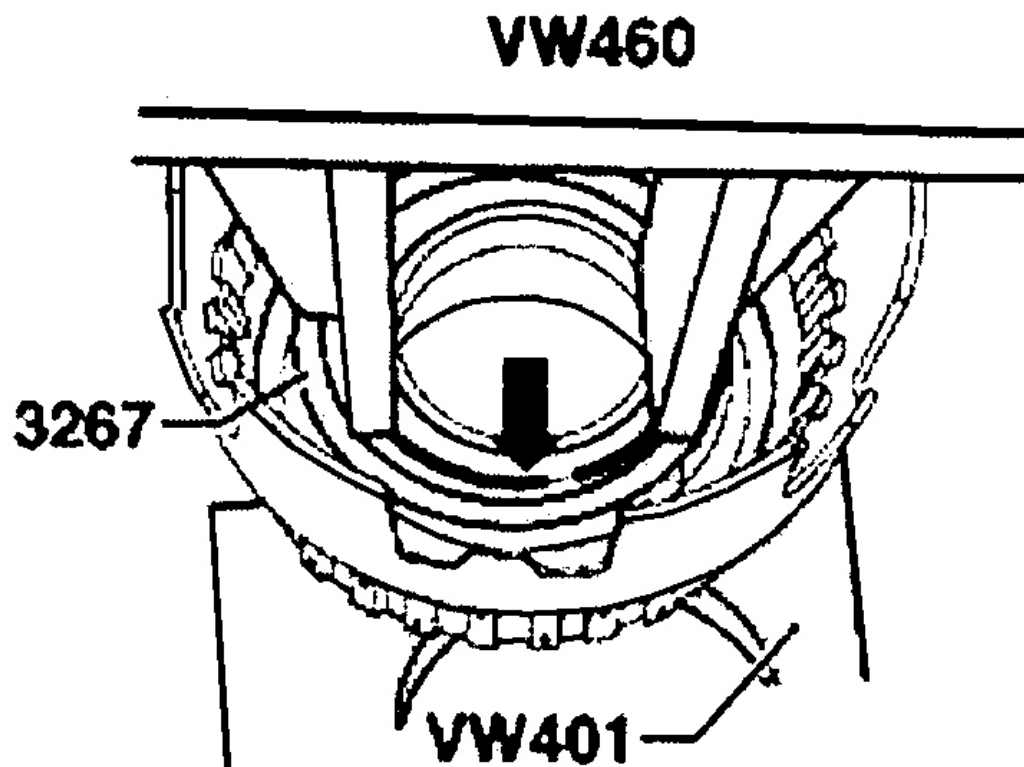
G00389921

Fig. 128: Identifying Reverse Gear Clutch Components
 Courtesy of VOLKSWAGEN UNITED STATES, INC.

Disassembling And Assembling

Press spring supporting plate down with 3267 just enough to be able to remove and install circlip. See **Fig. 129**.

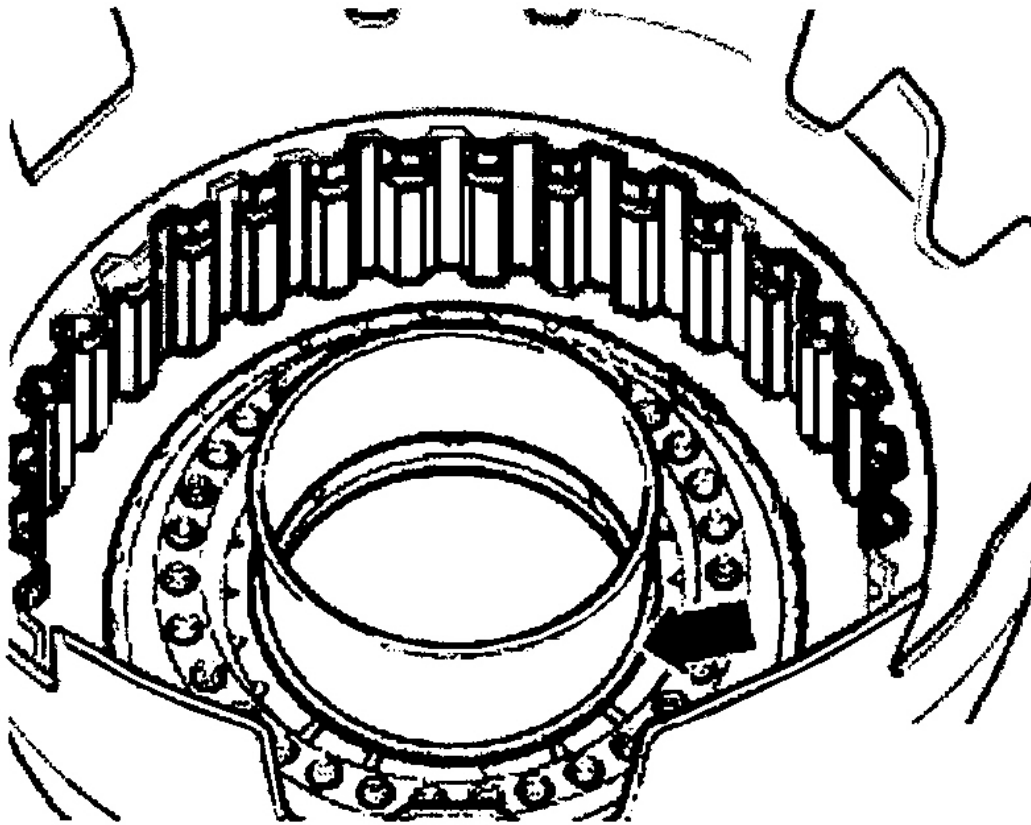
Do not damage clutch housing ball valve.



G00389922

Fig. 129: Removing & Installing Circlip (Reverse Gear Clutch)
Courtesy of VOLKSWAGEN UNITED STATES, INC.

Circlip (arrow) must be seated in the groove of clutch housing. Spring supporting plate must be centered relative to hub. See **Fig. 130** .



G00389923

Fig. 130: Installation Position Of Spring Supporting Plate (Reverse Gear Clutch)
Courtesy of VOLKSWAGEN UNITED STATES, INC.

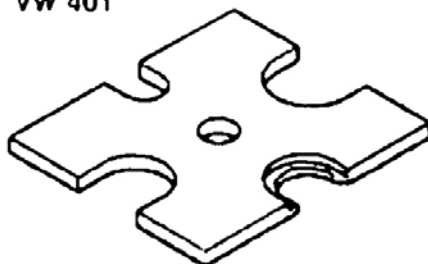
3RD AND 4TH GEAR CLUTCH -K3- WITH TURBINE SHAFT

Number of inner and outer plates varies based on transmission code. For correct number used, see **CODE LETTERS, TRANSMISSION APPLICATION, RATIOS, EQUIPMENT** .

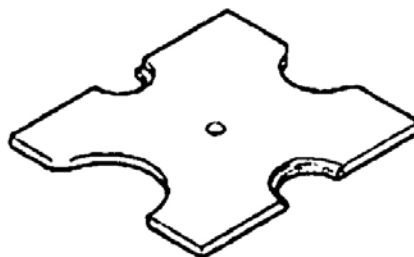
Special Tools And Equipment

- VW 401 Thrust plate
- VW 402 Thrust plate
- VW 407 Press tool
- 3292/1 From assembly tool 3292

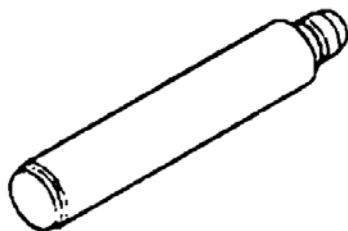
VW 401



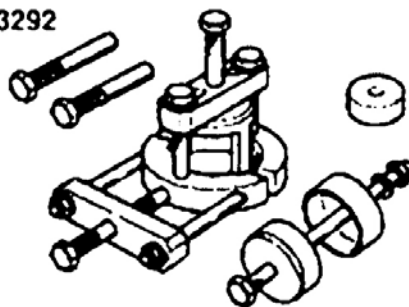
VW 402



VW 407

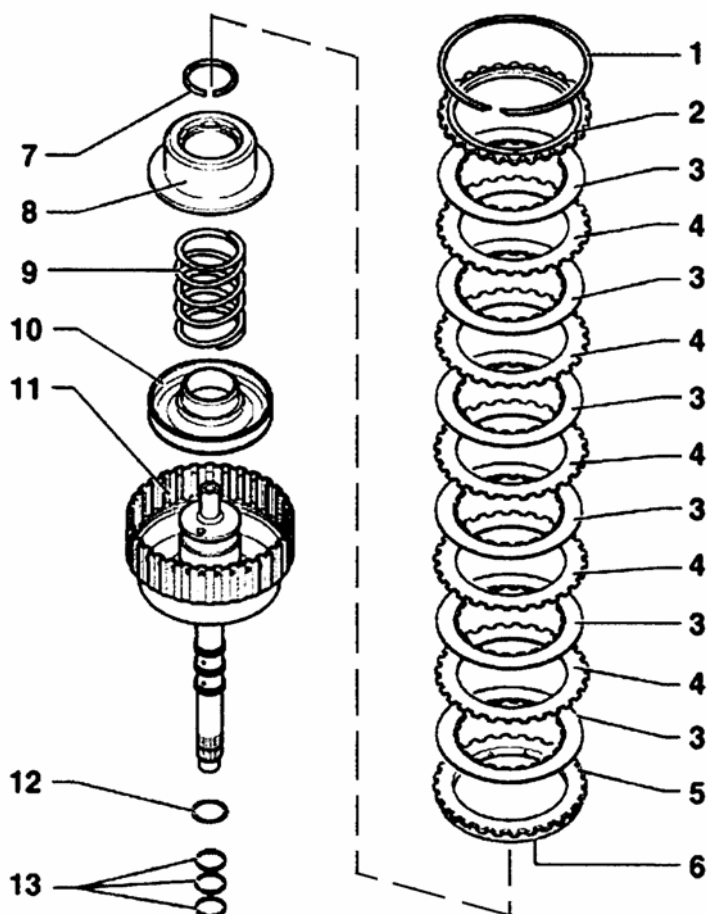


3292



G00389924

Fig. 131: Identifying 3rd & 4th Gear Clutch Special Tools
Courtesy of VOLKSWAGEN UNITED STATES, INC.



Note:

The clutch should only be disassembled for cleaning or to visually check parts.

The clutches -K1- and -K3- are pressed together.

1 - Circlip

- ◆ Different thickness
- ◆ Mark after removing and insert at same point

2 - Thrust plate

- ◆ Install with stepped side facing circlip

3 - Inner plate

4 - Outer plate

5 - Pressure plate

- ◆ Install with peened corrugated washer facing piston

6 - Corrugated washer

- ◆ Peened to pressure plate (item - 5 -)

7 - Securing ring

8 - Piston cap

- ◆ Sealing lips are vulcanized to piston cap
- ◆ Moisten with ATF before installing
- ◆ Turn piston cap slightly when installing
- ◆ When removing and installing press down and fit securing ring (item - 7 -)

9 - Spring

- ◆ Seat between piston and piston cap

10 - Piston

- ◆ Sealing lips are vulcanized to piston
- ◆ Moisten with ATF before installing
- ◆ Turn piston slightly when installing

11 - Clutch housing with turbine shaft

- ◆ Height varies according to number of inner and outer plates

12 - O-ring

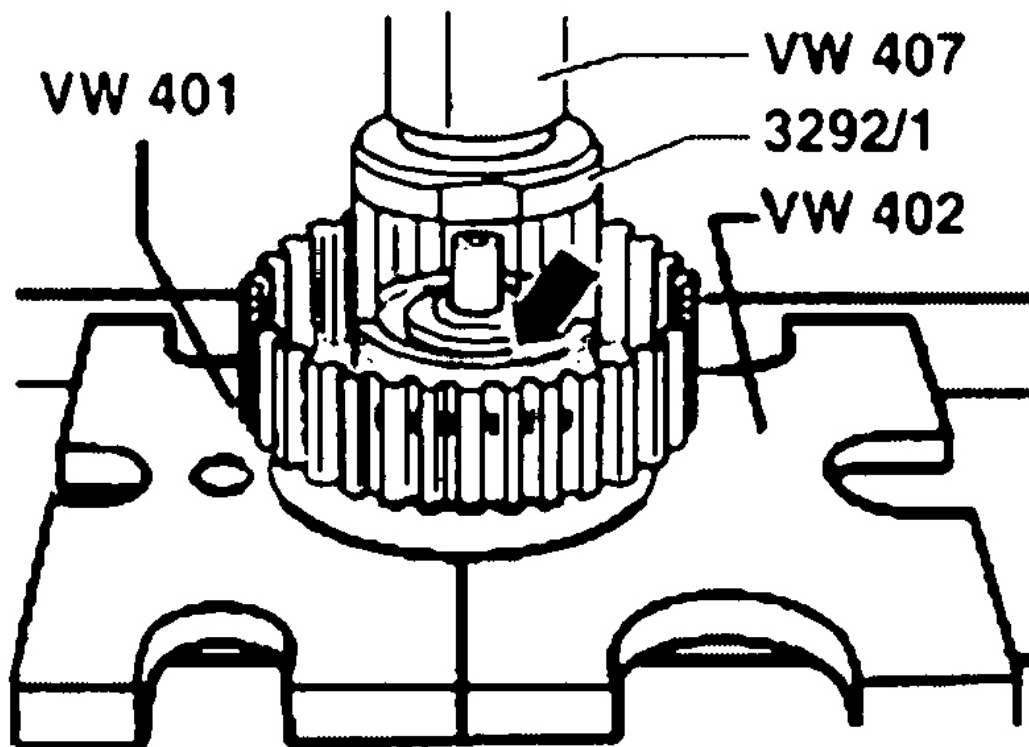
- ◆ Always replace

13 - Piston ring

Fig. 132: Identifying 3rd & 4th Gear Clutch Components
Courtesy of VOLKSWAGEN UNITED STATES, INC.

Disassembling And Assembling

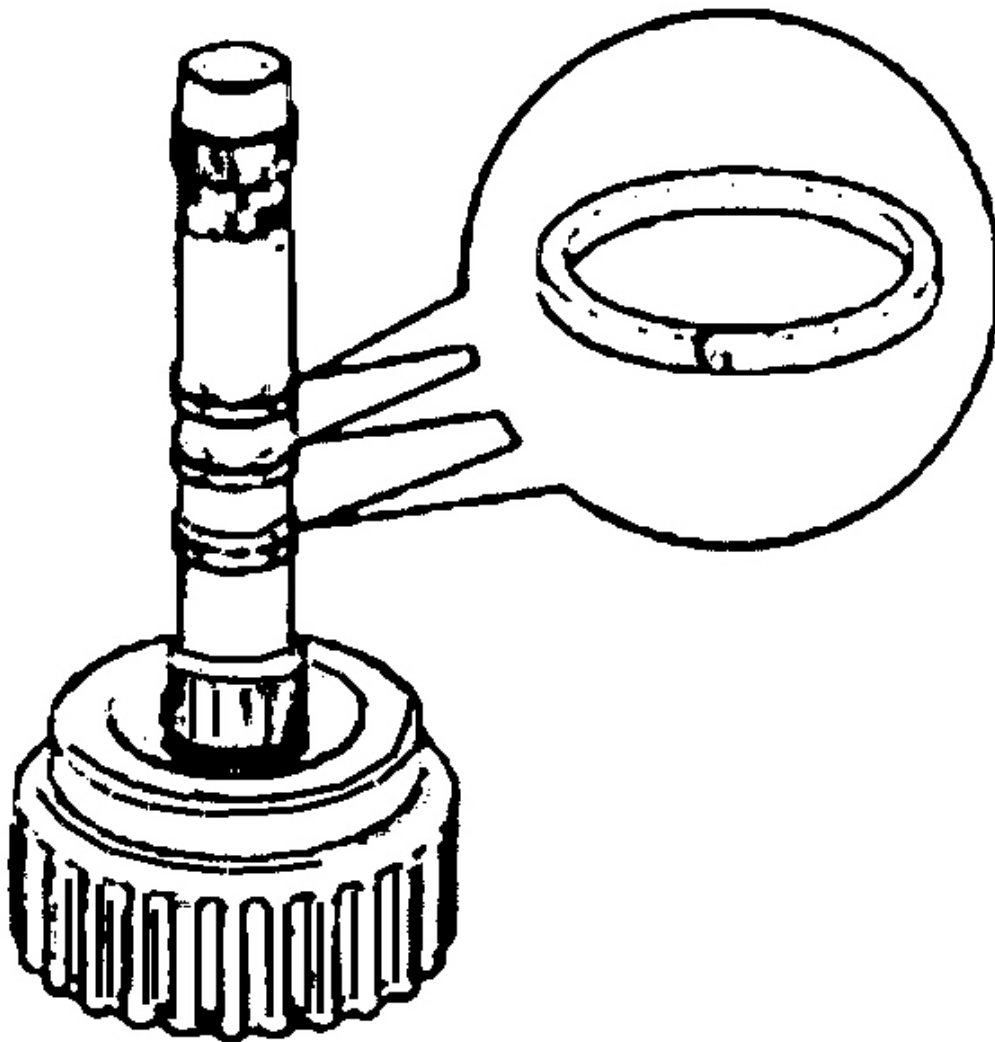
Press down carefully on piston cap until circlip can be installed. See **Fig. 133** .



G00389926

Fig. 133: Removing & Installing Circlip (3rd & 4th Gear Clutch)
Courtesy of VOLKSWAGEN UNITED STATES, INC.

A piston ring is installed on the pump shaft inside the clutch housing (arrow). See **Fig. 134** .



G00389927

Fig. 134: Checking Seating Of Piston Rings (3rd & 4th Gear Clutch)
Courtesy of VOLKSWAGEN UNITED STATES, INC.

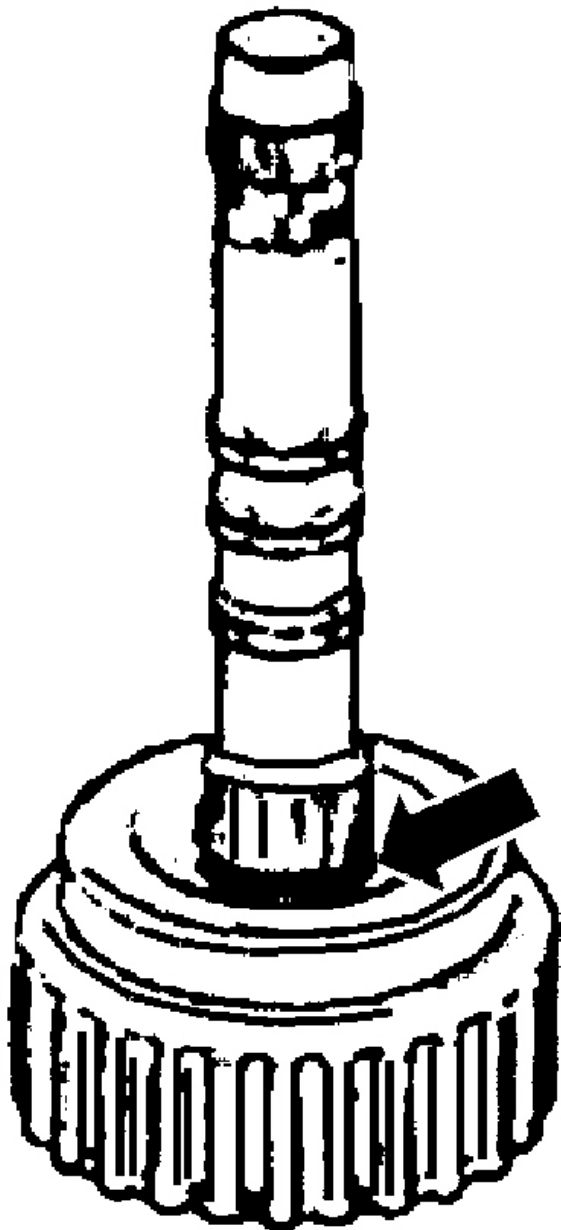
Make sure that ends of piston rings are hooked together.

Place piston ring in groove. See **Fig. 115** .

Hook ends together by pressing sides of ring in and guiding ends over one another.

NOTE: Do not twist piston ring out of groove on one side.

Insert O-ring in recess in turbine shaft (arrow). See Fig. 135 .



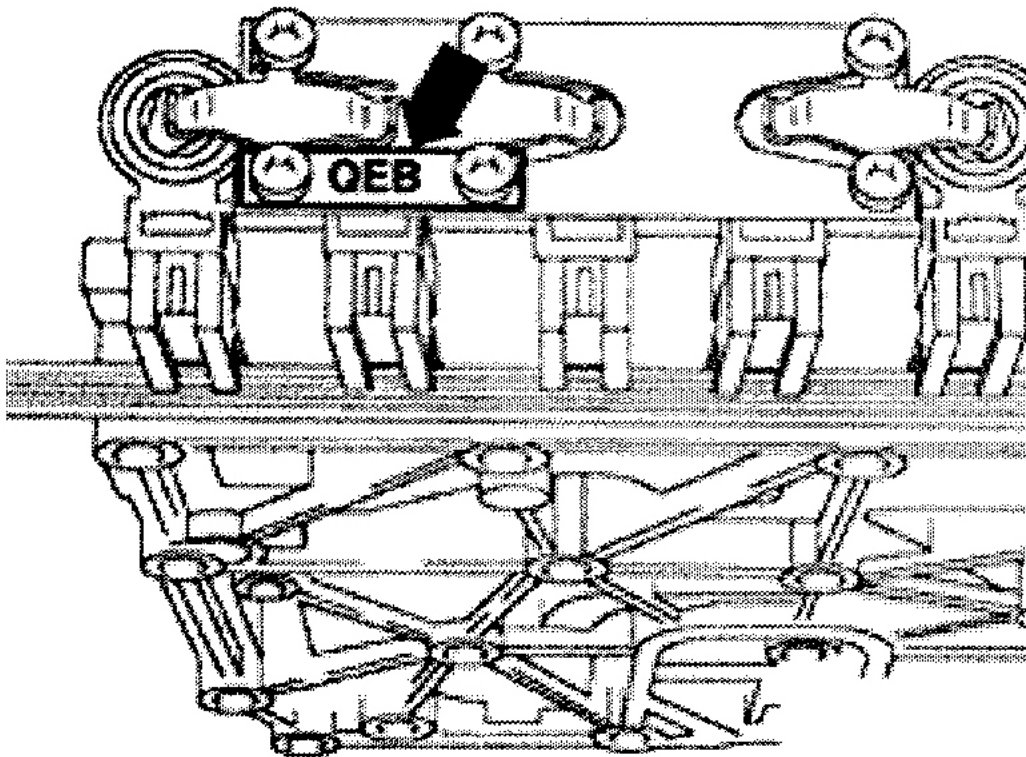
G00389928

Fig. 135: Installing "O" Ring (3rd & 4th Gear Clutch)
Courtesy of VOLKSWAGEN UNITED STATES, INC.

VALVE BODY

WARNING: DO NOT run engine or tow vehicle with oil pan removed or when there is no ATF fluid in transmission.

NOTE: Code letters are stamped on a metal tab located on valve body for component identification. Metal tab must remain on the valve body. See [Fig. 136](#) .



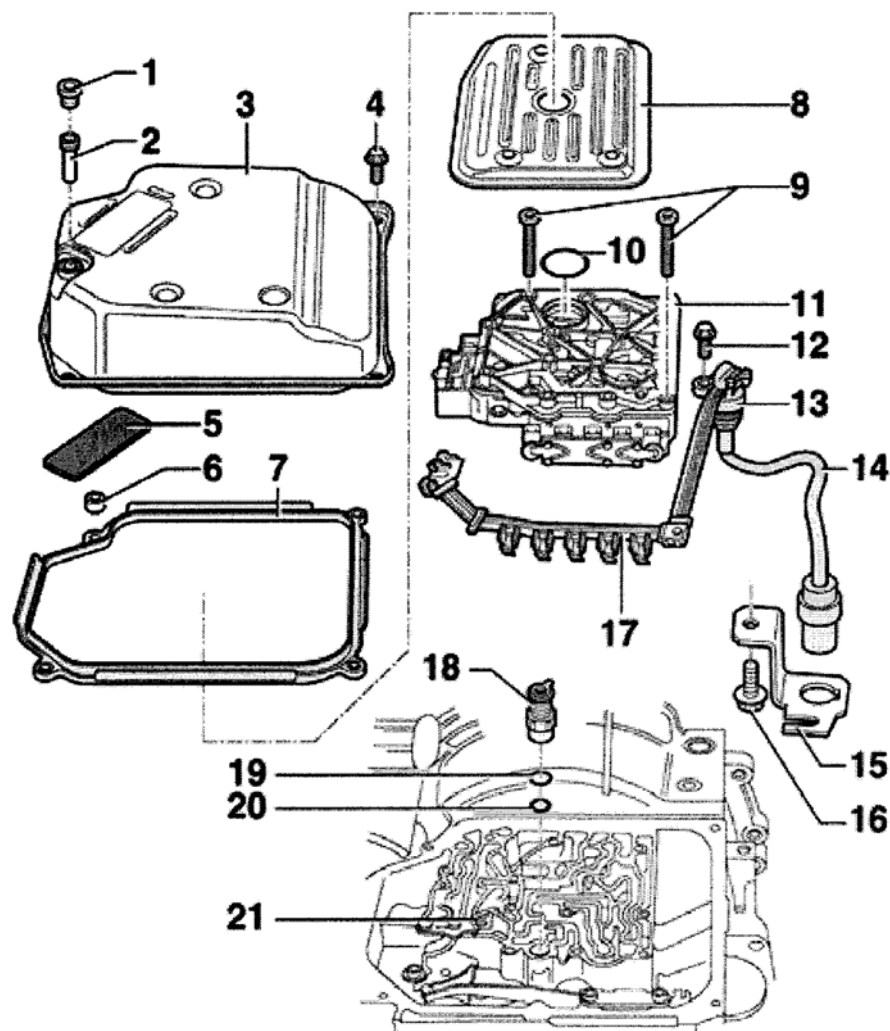
G00382794

Fig. 136: Locating Valve Body Identification Tab
Courtesy of VOLKSWAGEN UNITED STATES, INC.

Removal & Installation

Place container under transmission. Remove plug (2). See [Fig. 86](#) . Remove overflow pipe (1), and allow ATF to drain. Screw overflow pipe in onto stop.

Remove oil pan bolts, oil pan, gasket and ATF screen. See **Fig. 137** .

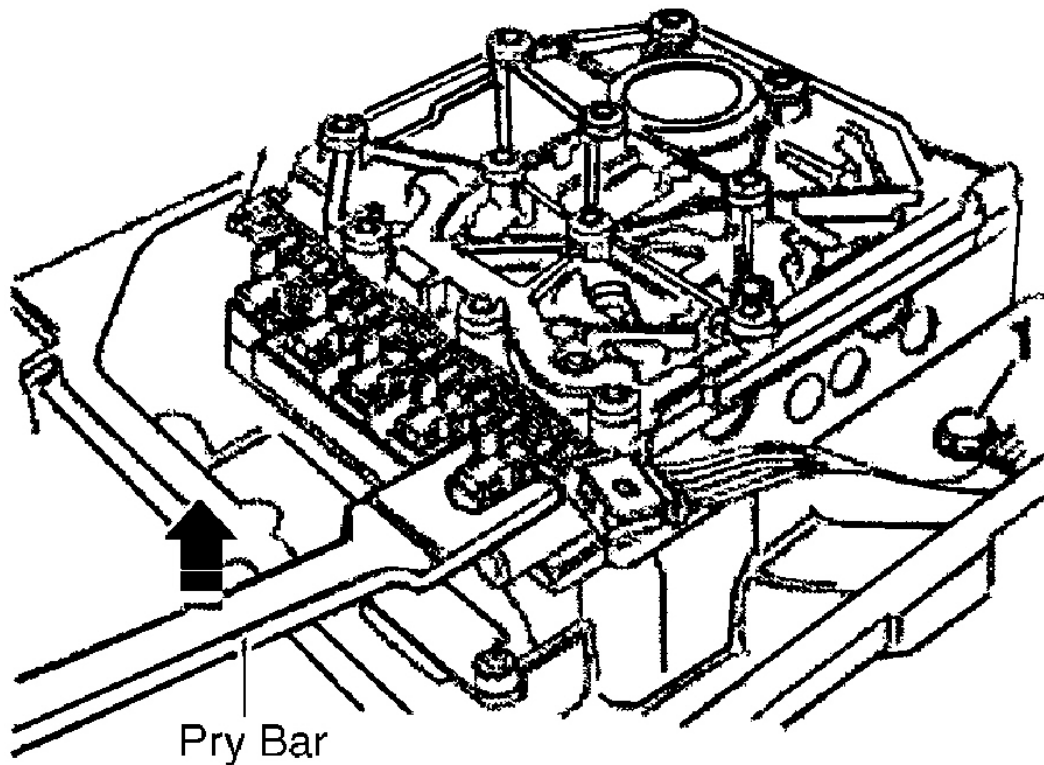


- | | |
|-------------------------|---|
| 1. ATF Level Plug | 11. Valve Body |
| 2. Overflow Pipe | 12. Conductor Strip Bolt |
| 3. Transmission Oil Pan | 13. O-Ring |
| 4. Oil Pan Bolt | 14. Conductor Strip |
| 5. Magnet | 15. Retaining Bracket |
| 6. Spacer Bushing | 16. Retaining Bracket Bolt |
| 7. Oil Pan Gasket | 17. Solenoid Valves Plug |
| 8. ATF Filter | 18. Sealing Plug |
| 9. Valve Body Bolt | 19. O-Ring |
| 10. Valve Body Gasket | 20. O-Ring |
| | 21. Manual Selector Valve Operating Rod |

G00382787

Fig. 137: Exploded View Of Valve Body Components
 Courtesy of VOLKSWAGEN UNITED STATES, INC.

Remove conductor strip, by placing Pry Bar (3373) onto stop under solenoid valve plug. Pull plug off, with pry bar in direction of arrow. See **Fig. 138** . Remove bolt (1), and conductor strip.

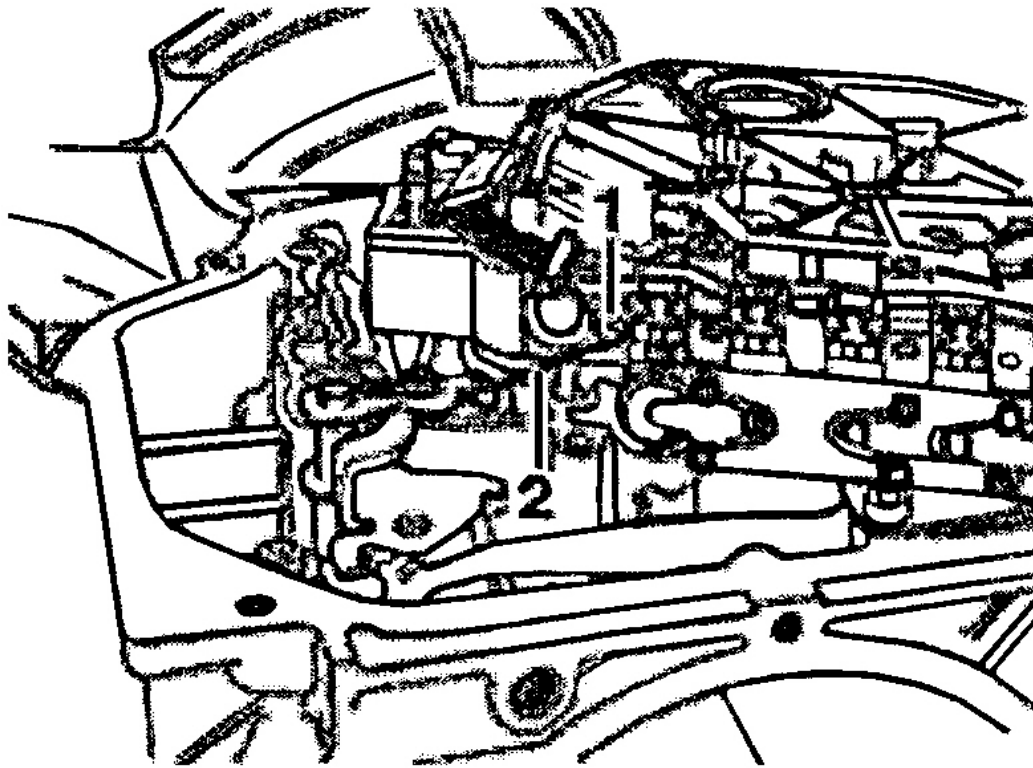


G00204363

Fig. 138: Removing Conductor Strip

Courtesy of VOLKSWAGEN UNITED STATES, INC.

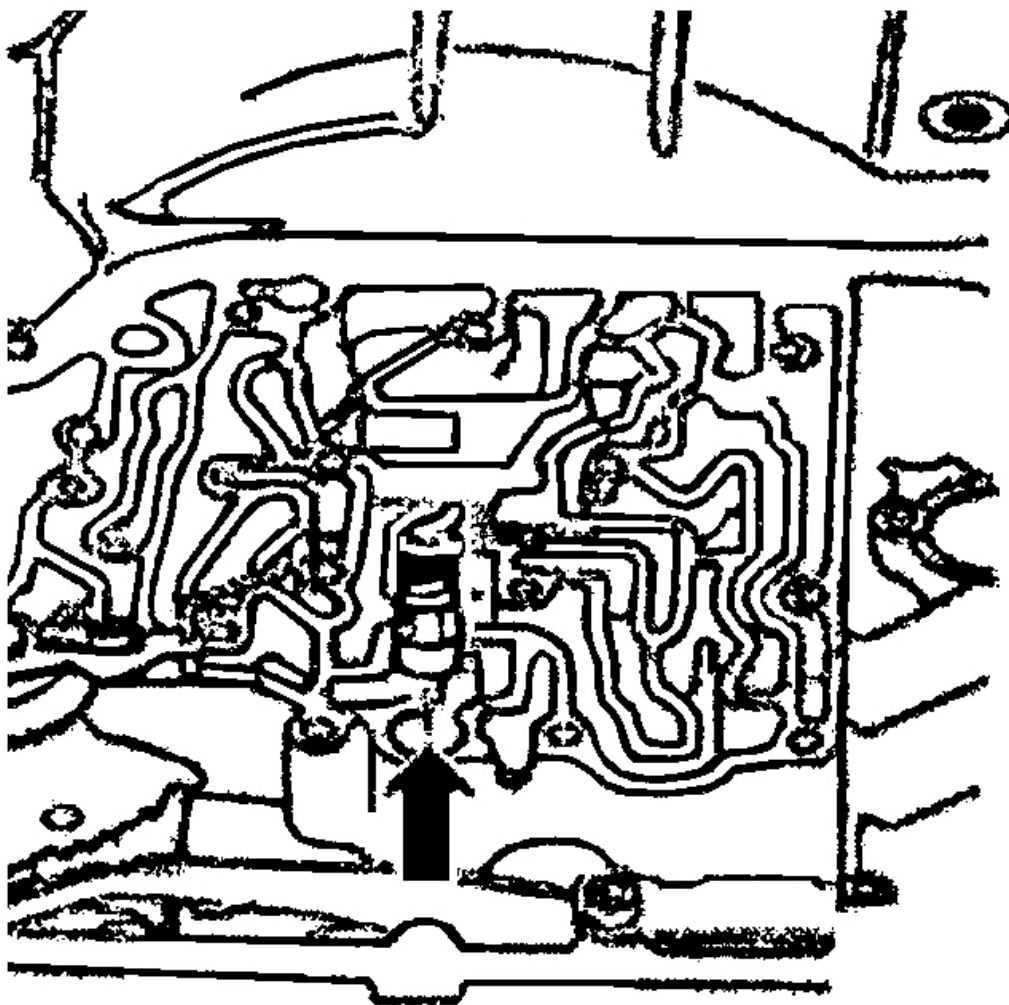
When removing valve body, manual selector valve (1) remains in valve body. See **Fig. 139** . Remove valve body bolts and valve body. Shift selector lever/shaft into position 1. Pull manual selector valve out, until it is just possible to unhook operating rod (2). Secure manual selector valve so it cannot fall out.



G00204364

Fig. 139: Removing Valve Body & Unhooking Operating Rod
Courtesy of VOLKSWAGEN UNITED STATES, INC.

Pull sealing plug out of housing before removing and installing free wheel, otherwise sealing plug and O-ring will be damaged. Moisten 2 NEW O-rings with ATF and install to sealing plug. Insert sealing plug in hole in transmission housing (arrow). See **Fig. 140** .



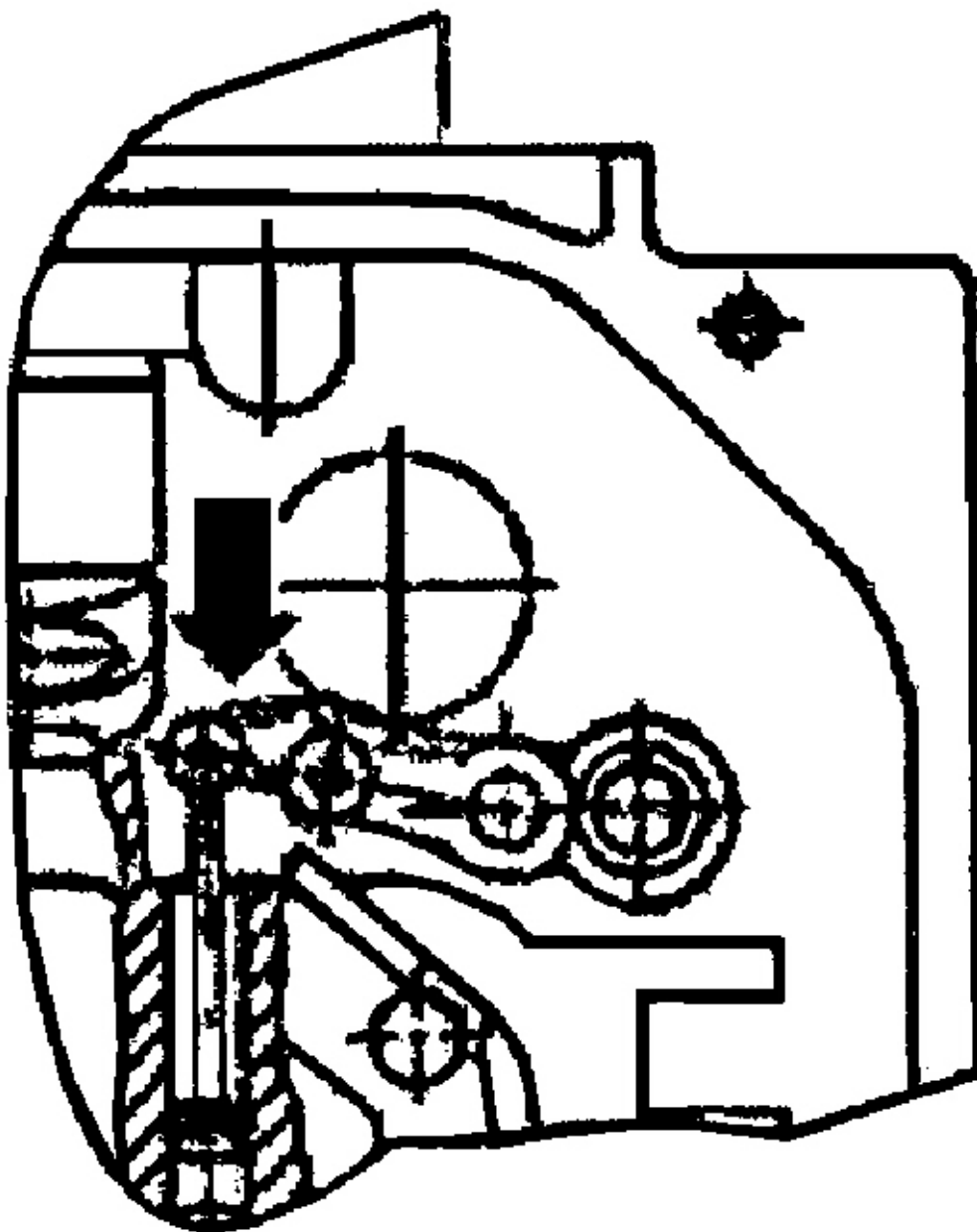
G00204366

Fig. 140: Inserting Sealing Plug

Courtesy of VOLKSWAGEN UNITED STATES, INC.

Turn manual selector valve (1), so shoulder faces operating rod. See **Fig. 139** . Guide operating rod (2) with manual selector valve into valve body. Install with stepped side of rod facing manual selector valve.

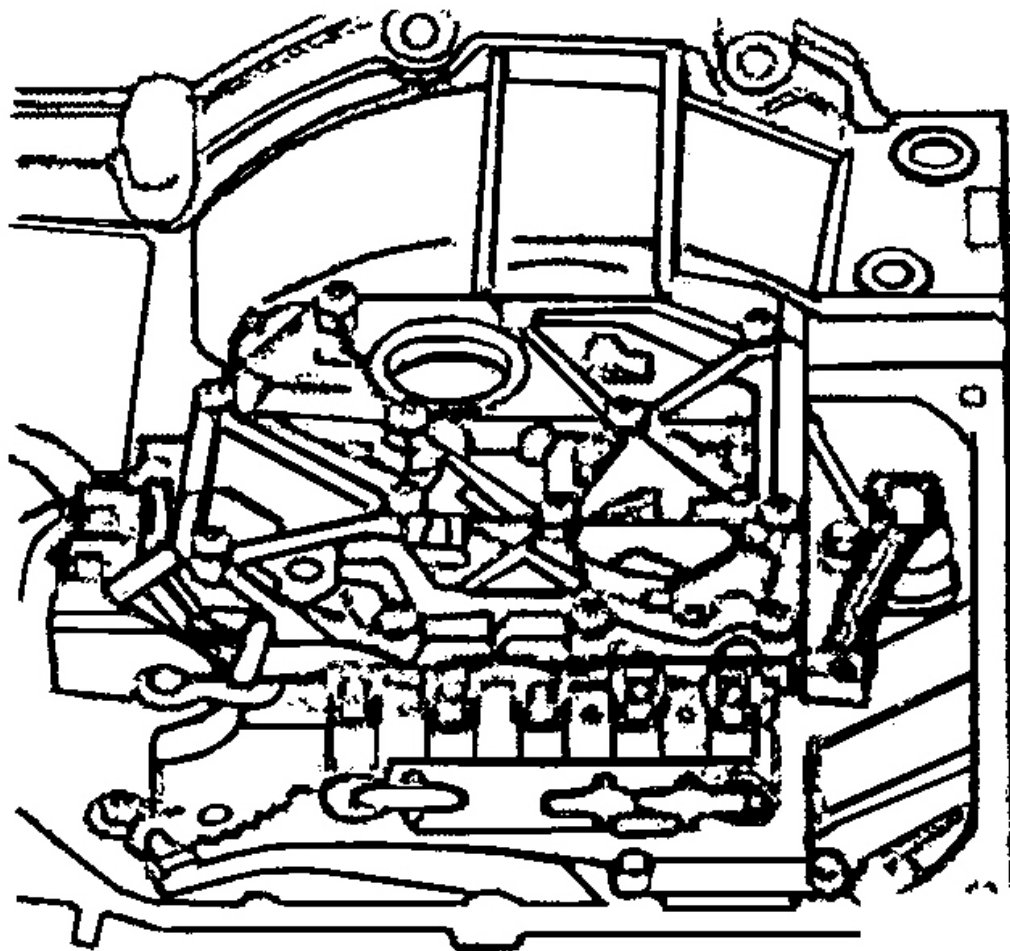
To adjust operating rod, move selector shaft to position "P". Push operating rod with manual selector valve into valve body onto stop (direction of arrow). See **Fig. 141** . Tighten bolt to 35 INCH lbs. (4 N.m). Ensure selector valve is resting against stop. Counter-hold (in direction of arrow) when tightening bolt. Always replace bolt and manual selector valve retaining clip.



G00204383

Fig. 141: Adjusting Operating Rod For Manual Selector Valve
Courtesy of VOLKSWAGEN UNITED STATES, INC.

Install valve body and bolts. Tighten the two centering bolts first by hand. Tighten bolts to 44 INCH lbs. (5 N.m). When installing conductor strip, route conductor strip as shown. See **Fig. 142** . Ensure conductor strip is not kinked or twisted.



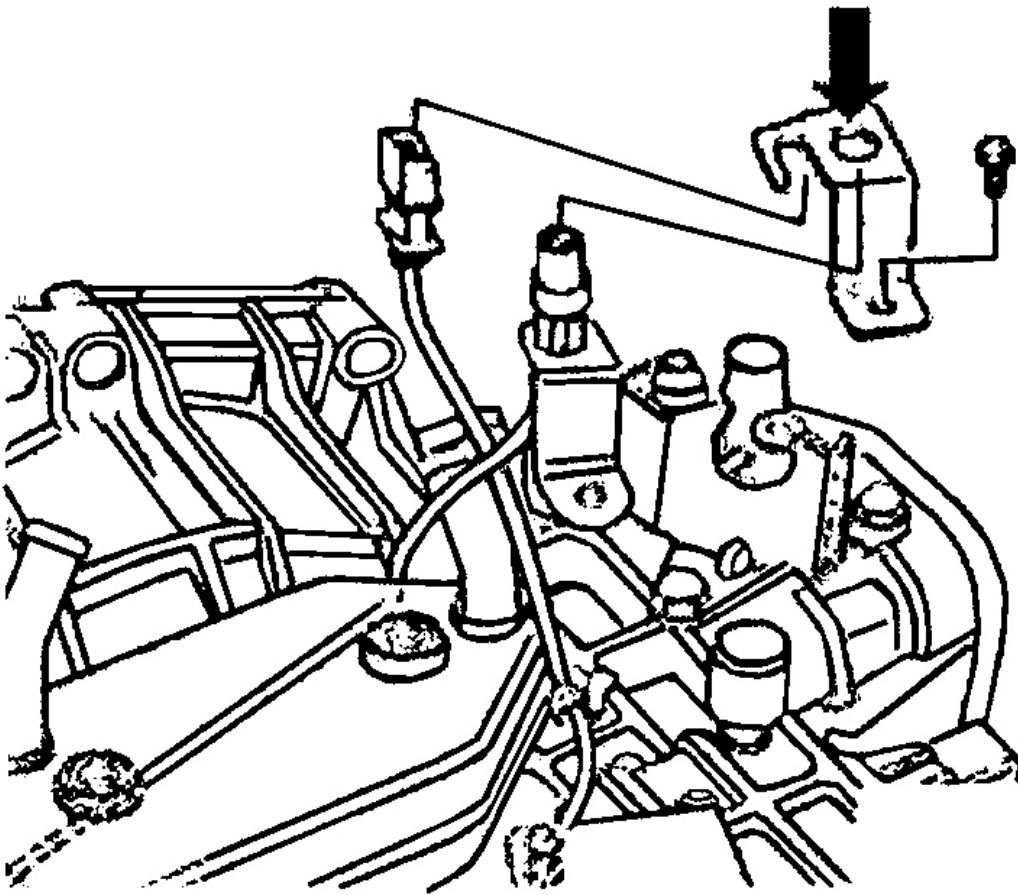
G00204384

Fig. 142: Installing Conductor Strip

Courtesy of VOLKSWAGEN UNITED STATES, INC.

Before installing ATF filter, insert seal in valve body. Firmly press ATF filter onto valve body. See **Fig. 137** .

Secure clip with bolt for conductor strip connector by connecting conductor strip connector to lower retainer. Install upper retainer with recess (arrow) onto connector tab. See **Fig. 143** . Tighten bolt to 15 ft. lbs. (20 N.m).



G00204385

Fig. 143: Installing Upper Retainer Onto Connector Tab
Courtesy of VOLKSWAGEN UNITED STATES, INC.

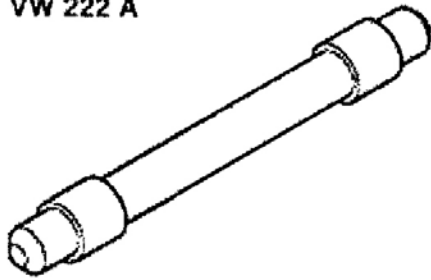
Install oil pan, gasket and bolts. Tighten oil pan bolts to 106 INCH lbs. (12 N.m). Check transmission fluid level. See **SERVICING - A/T (01M)** article.

PARKING LOCK

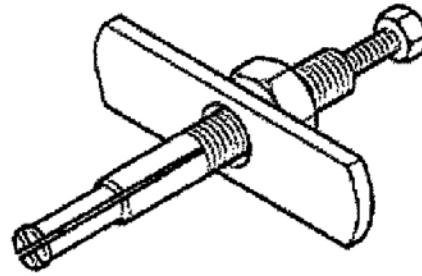
Special Tools And Equipment

- VW 222 A Drift
- VW 228 B Puller
- VW 423 Tube
- VW 460/2 Mandrel

VW 222 A



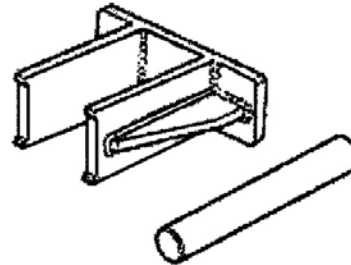
VW 228 B



VW 423

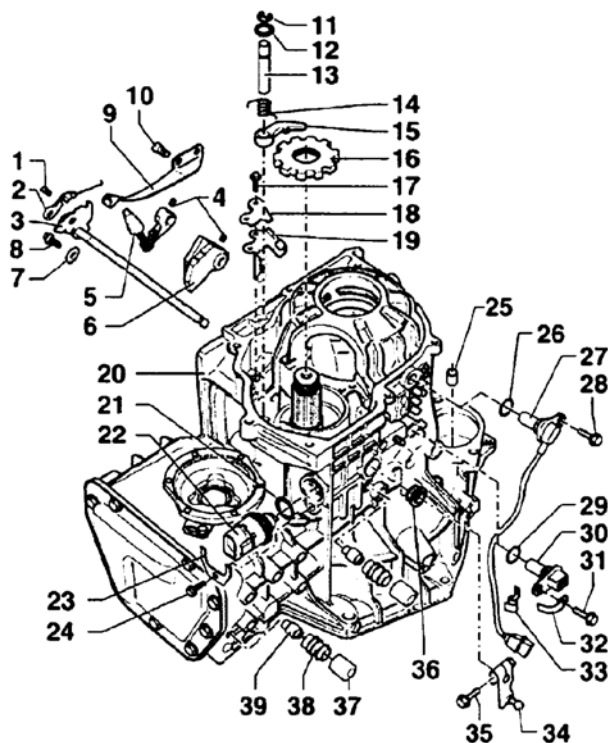


VW 460



G00389929

Fig. 144: Parking Lock Special Tools
Courtesy of VOLKSWAGEN UNITED STATES, INC.



Note:

The output gear must be removed to disassemble and assemble the parking lock.

- | | |
|--|--|
| 1. Bolt, 4 Nm | 21. O-Ring (Always replace) |
| 2. Manual Selector Valve Control | 22. Multi-Function Transmission Range (TR) Switch -F125- |
| 3. Selector Shaft With Selector Segment | 23. Retainer |
| 4. Spring Pin | For multi-function TR switch |
| 5. Engaging Lever | 24. Bolt, 10 Nm |
| Insert together with selector shaft and detent segment | 25. Mounting Bushing |
| 6. Detent Segment | 26. O-Ring (Always replace) |
| Insert together with selector shaft and engaging lever | 27. Vehicle Speed Sensor -G68- |
| 7. Locking Washer | 28. Bolt, 10 Nm |
| 8. Bolt, 10 Nm | 29. O-Ring (Always replace) |
| 9. Spring For Selector Segment | 30. Transmission Vehicle Speed Sensor -G38- |
| 10. Bolt, 10 Nm | 31. Bolt, 10 Nm |
| 11. O-Ring (Always replace) | 32. Retainer |
| Only install on shafts with groove for circlip | For wire to vehicle speed sensor |
| 12. Washer | Secure with bolt -item 31 - |
| 13. Shaft For Detent Lever | 33. Retaining Clip |
| Is secured by circlip and bearing cap of drive pinion | For wire to vehicle speed sensor |
| 14. Return Spring | 34. Lever |
| 15. Detent Lever | For selector shaft |
| 16. Parking Lock Gear | 35. Bolt, 10 Nm |
| Rounded side faces teeth of drive pinion | 36. O-Ring |
| 17. Bolt, 14 Nm | Pry out with screwdriver |
| 18. Supporting Plate | Drive in flush with VW 423 |
| 19. Guide Plate | 37. Breather Cap |
| Insert before supporting plate | 38. Breather |
| 20. Transmission Housing | 39. Breather Pipe |
| It is not necessary to remove the drive gear to | Remove using pliers |
| disassemble the parking lock | Drive onto stop with drift VW 460/2 |

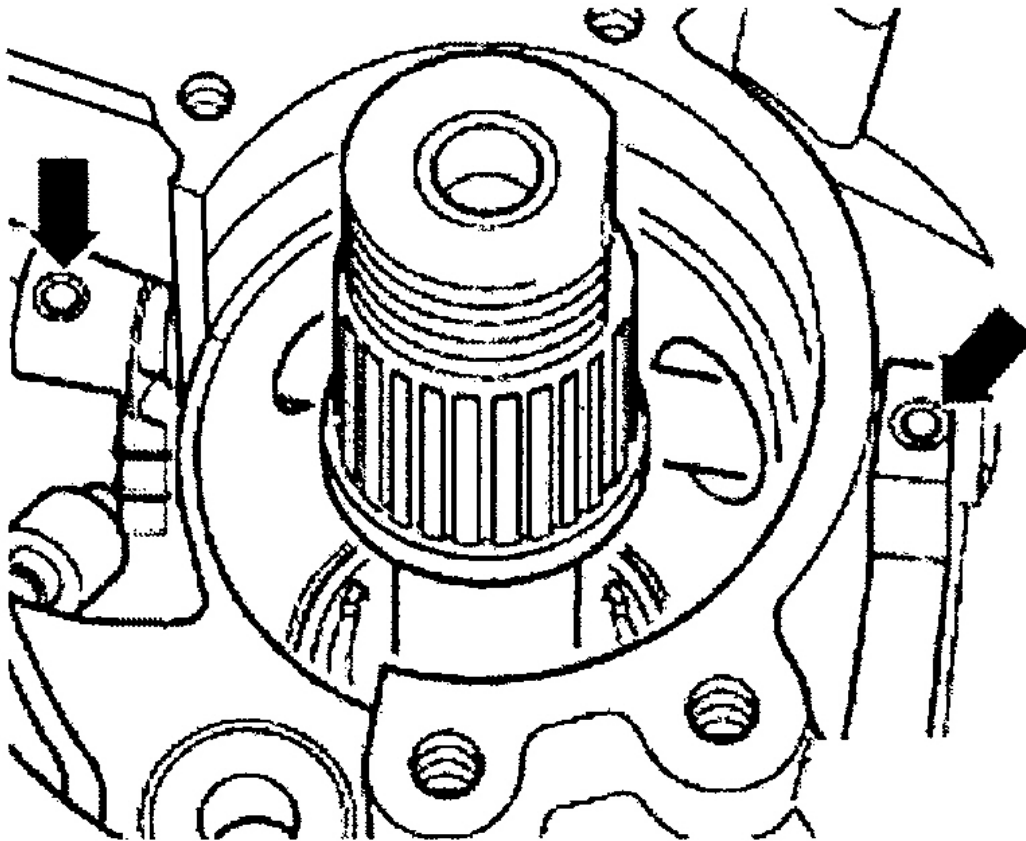
G00389930

Fig. 145: Exploded View Of Parking Lock Assembly
Courtesy of VOLKSWAGEN UNITED STATES, INC.

Disassembling And Assembling

Driving Spring Pins Out And In

Drive spring pin for engaging lever and spring pin for detent segment out only far enough to remove the selector shaft. See **Fig. 146** .



G00389931

Fig. 146: Driving Spring Pins Out & In
Courtesy of VOLKSWAGEN UNITED STATES, INC.

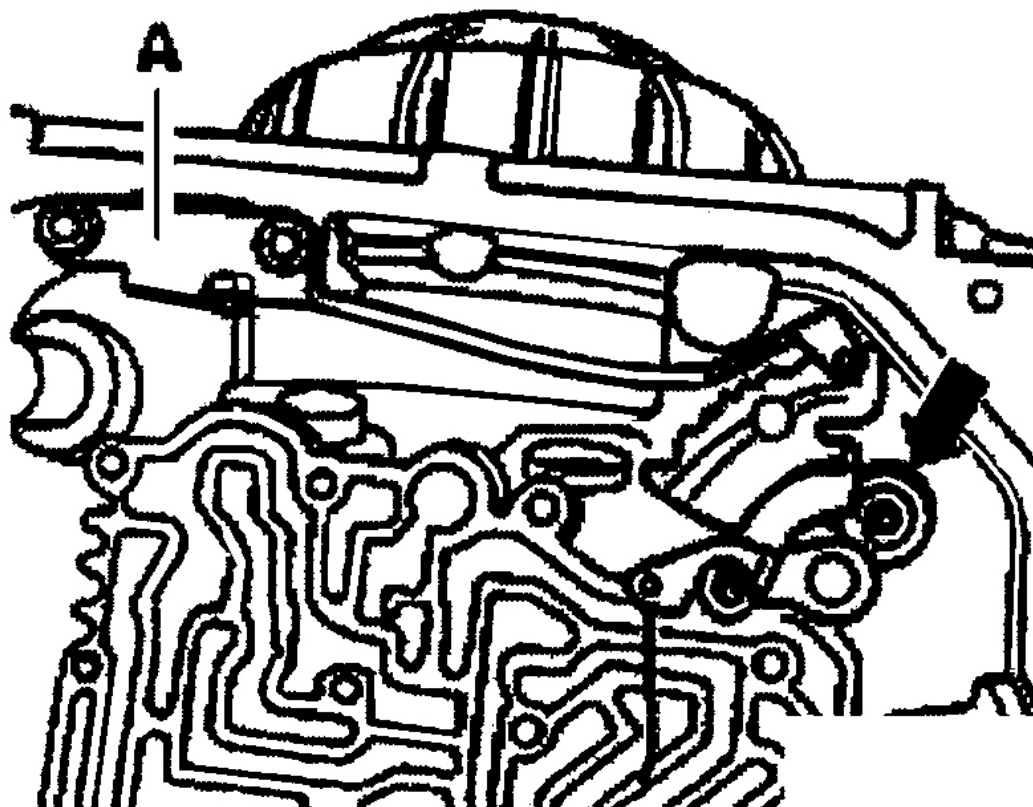
NOTE: If driven in further spring pin of engaging lever may drop into transmission.

Drive in spring pins until flush after inserting selector shaft, engaging lever and detent segment.

Removing And Installing Selector Shaft With Selector Segments

With valve body installed do not damage the conductor strip.

Remove selector segment spring -A-. See **Fig. 147** .



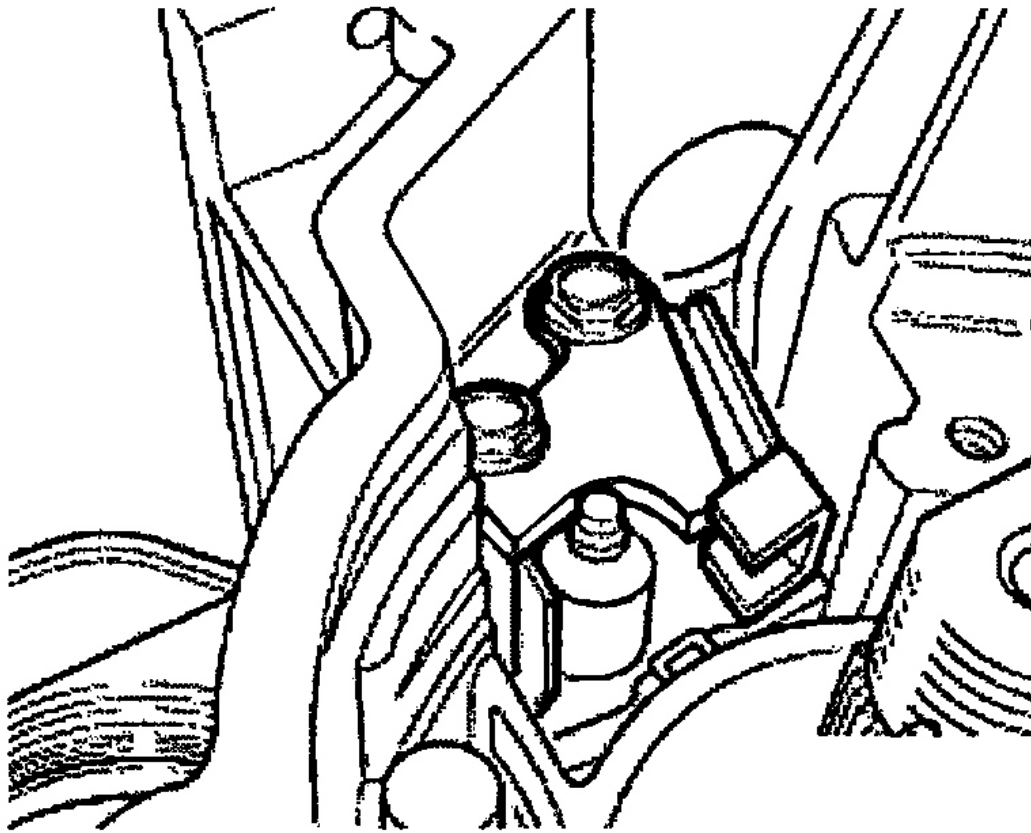
G00389932

Fig. 147: Removing & Installing Selector Shaft
Courtesy of VOLKSWAGEN UNITED STATES, INC.

Remove screw with washer (arrow).

The washer prevents selector shaft movement.

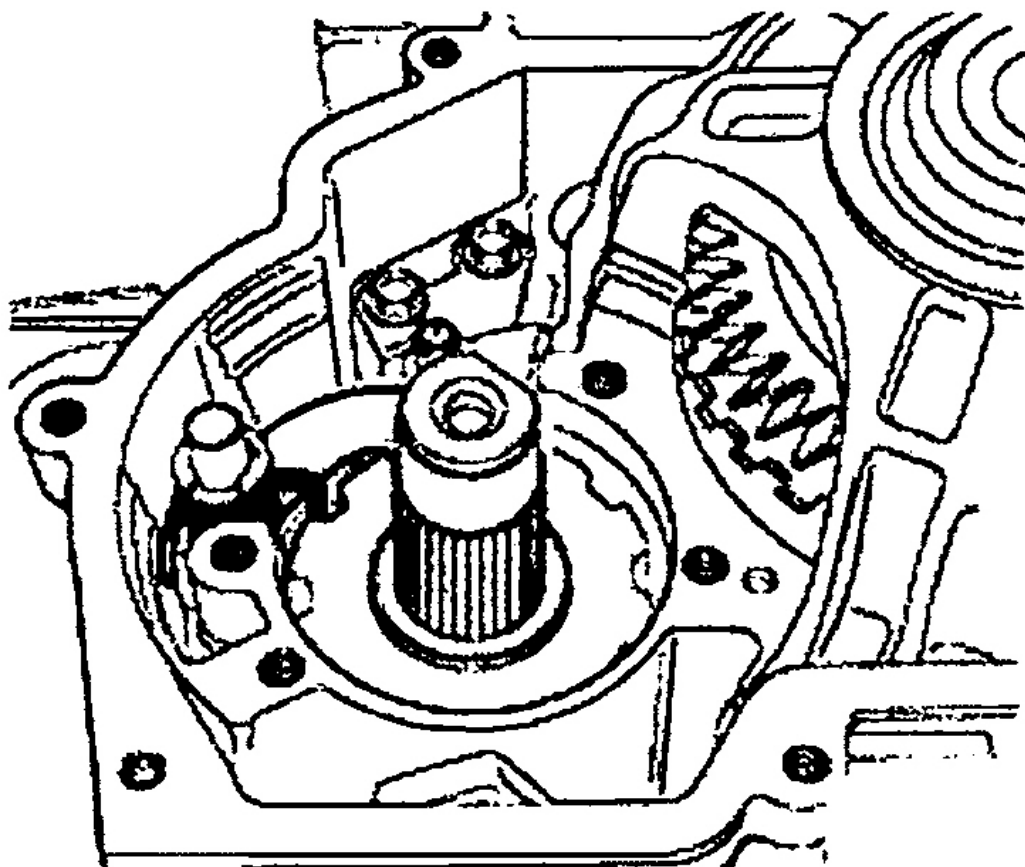
Inserting Guide Plate And Supporting Plate



G00389933

Fig. 148: Inserting Guide Plate & Supporting Plate
Courtesy of VOLKSWAGEN UNITED STATES, INC.

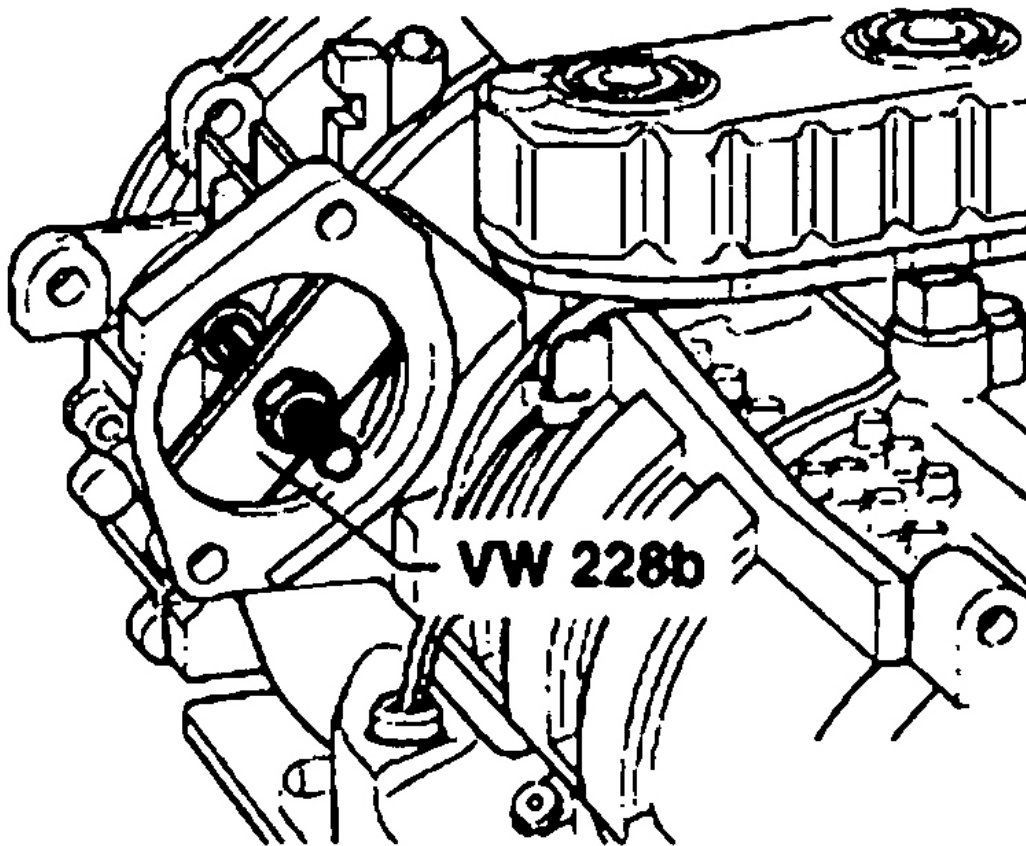
Inserting Pawl With Return Spring



G00389934

Fig. 149: Inserting Pawl W/Return Spring
Courtesy of VOLKSWAGEN UNITED STATES, INC.

Pulling Out Starter Bushing

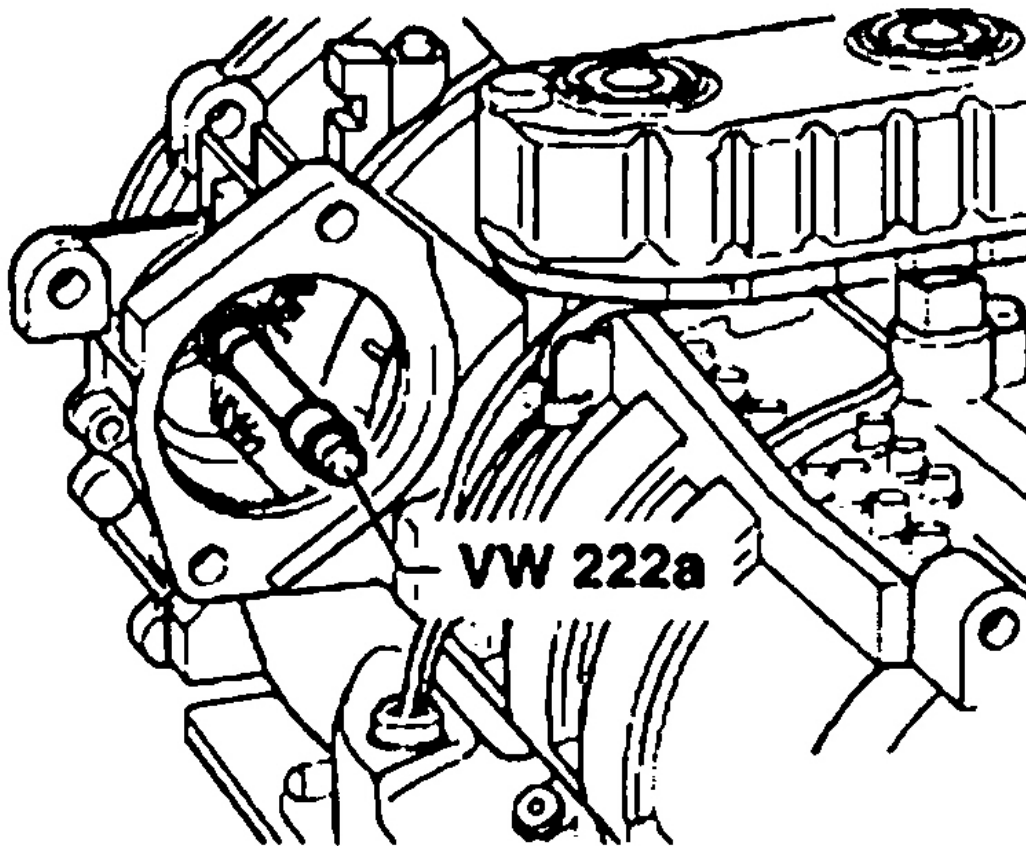


G00389935

Fig. 150: Pulling Out Starter Bushing
Courtesy of VOLKSWAGEN UNITED STATES, INC.

Driving In Starter Bushing

Lubricate bushing mounting before driving in.

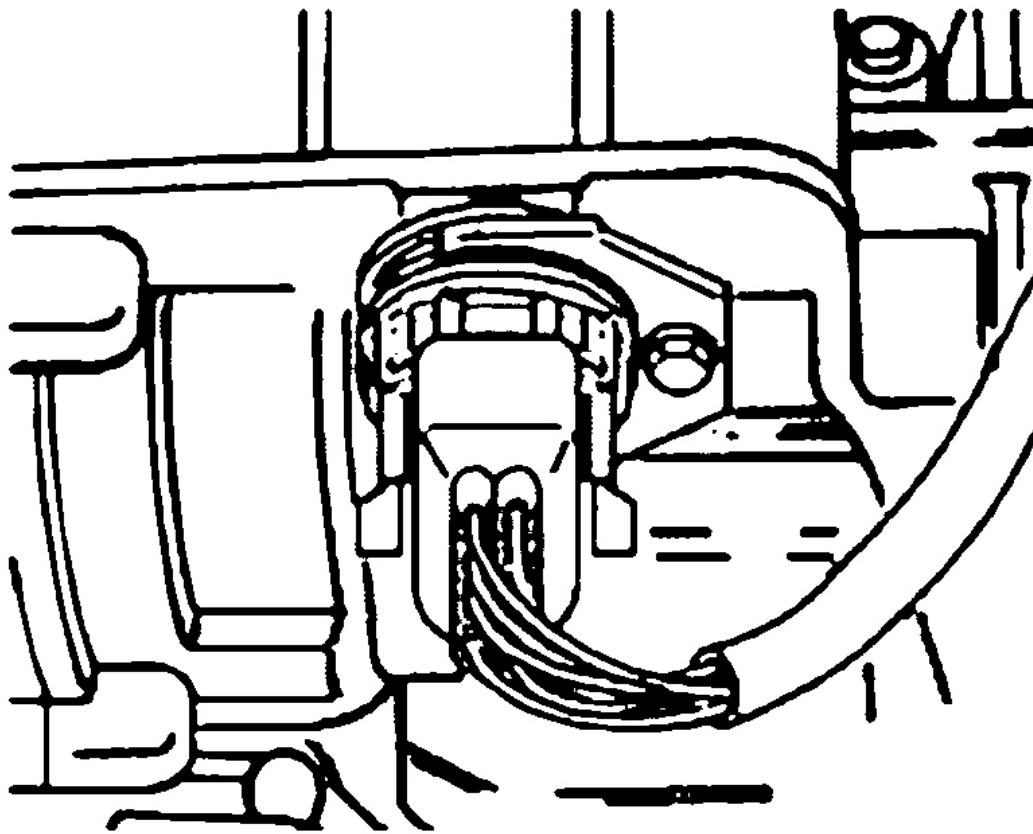


G00389936

Fig. 151: Driving In Starter Bushing
Courtesy of VOLKSWAGEN UNITED STATES, INC.

Removing And Installing Multi-Function TR Switch

Location: The multi-function TR switch is located on rear of the transmission.



G00385566

Fig. 152: Identifying Multi-Function Transmission Range
Courtesy of AUDI OF AMERICA, INC.

Switch ignition off, open hood.

Pull connector off multi-function TR switch.

Remove bolt and retainer.

Remove multi-function TR switch.

Replace seal.

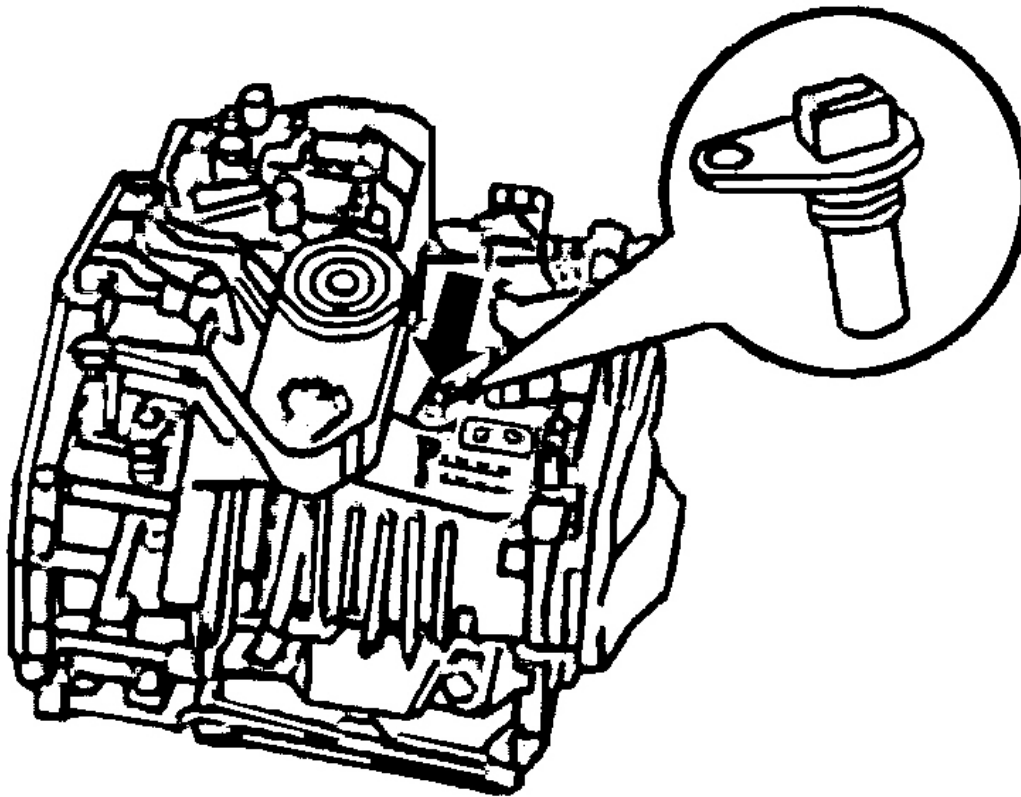
Installation is performed in the reverse order of removal.

Insert switch so that each pin rests on a slope of detent segment.

Tighten bolt to 10 Nm.

Removing And Installing Transmission Vehicle Speed Sensor -G68-

Location: The transmission speed sensor -arrow- is located on top of the transmission.



G00385576

Fig. 153: Identifying Transmission Vehicle Speed Sensor
Courtesy of VOLKSWAGEN UNITED STATES, INC.

Switch ignition off, open hood.

Disconnect white connector at sensor.

Remove bolt and pull sensor out.

Replace seal.

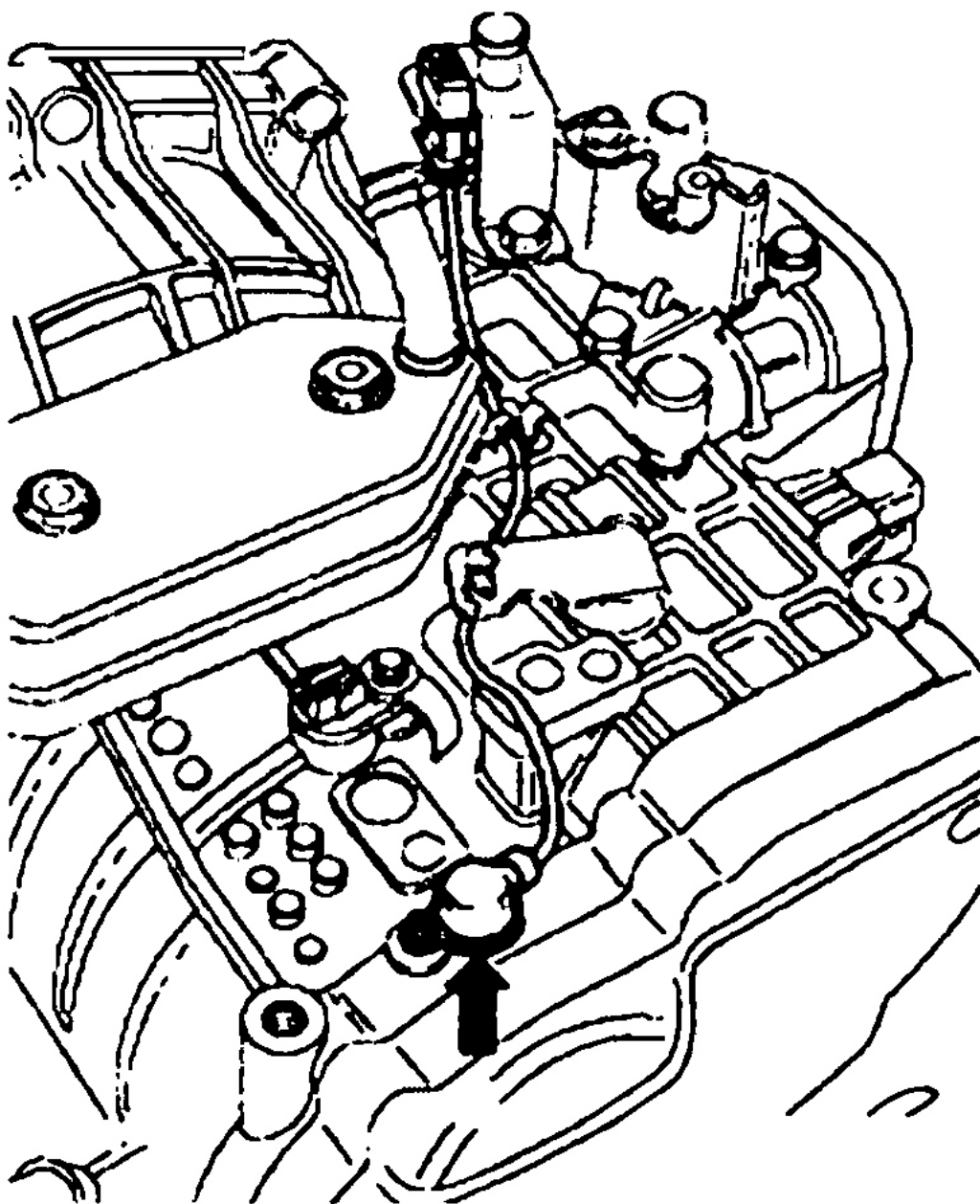
Installation is performed in the reverse order of removal.

Tighten bolt to 10 Nm.

Removing And Installing Vehicle Speed Sensor -G68- With Transmission Installed

Location: The vehicle speed sensor -arrow- is located on top of transmission.

When the transmission is installed, the sensor is covered by the left assembly mounting.



G00389937

Fig. 154: Locating Vehicle Speed Sensor
Courtesy of VOLKSWAGEN UNITED STATES, INC.

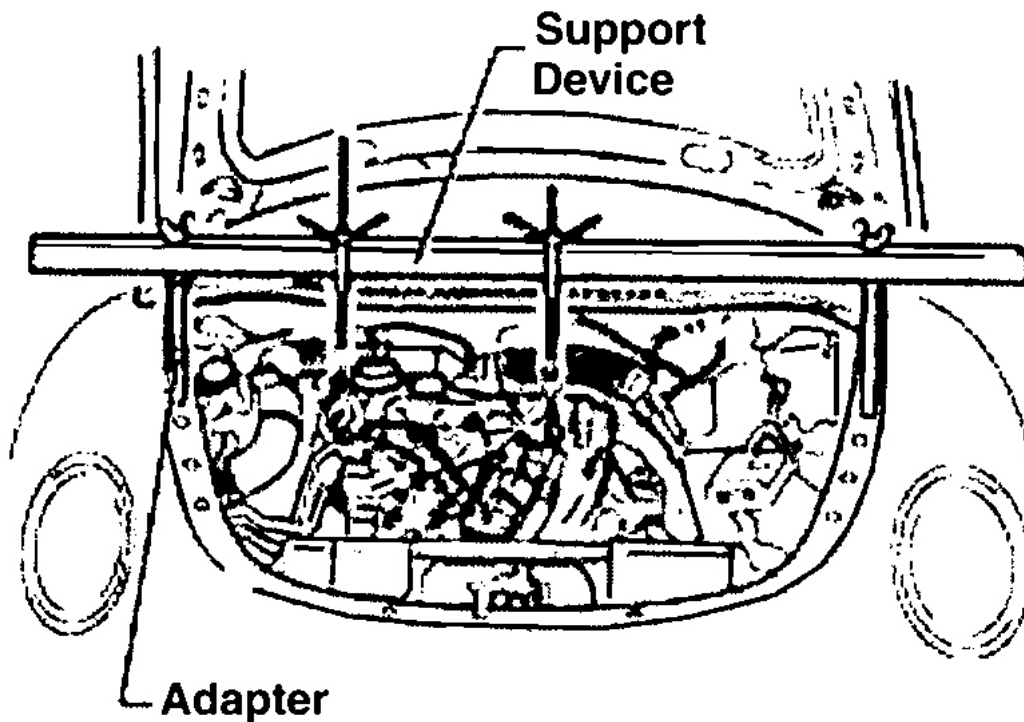
Obtain radio code on vehicles with coded radio.

With ignition switched off disconnect battery Ground strap and remove battery.

Remove air cleaner.

Remove hoses and cable connections in area of engine mounting eye for support 10-222 A.

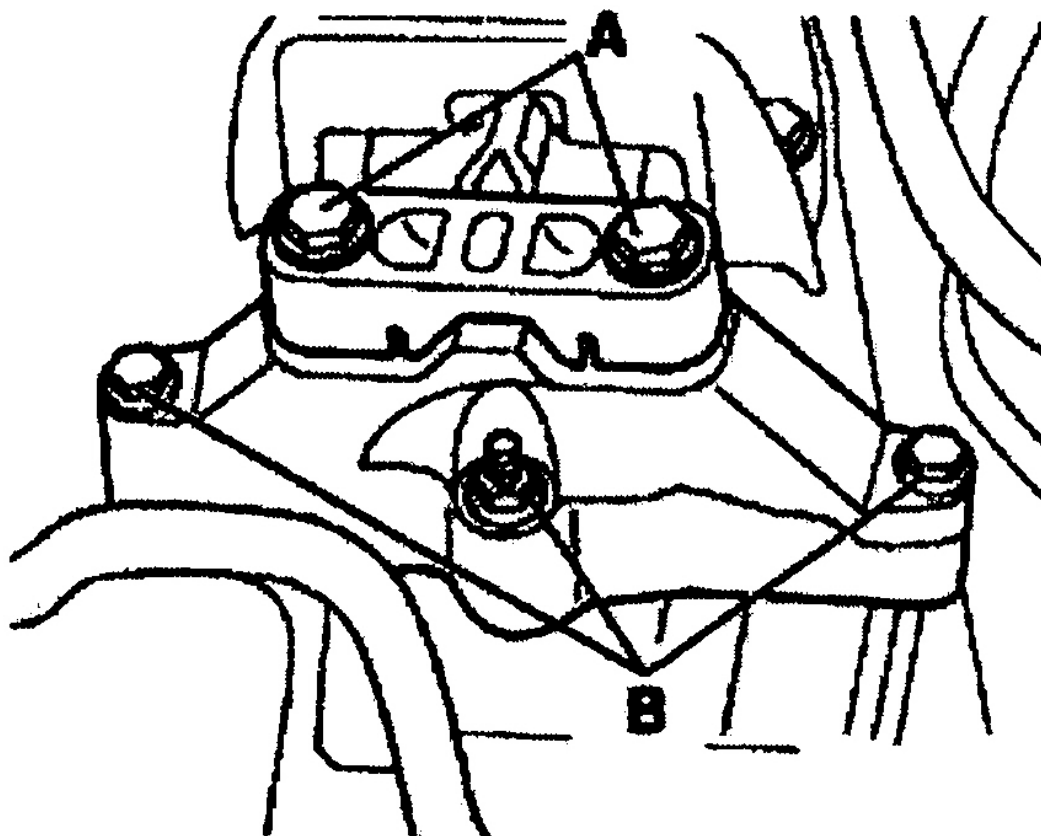
Erect support device 10-222 A with adapters 10-222 A/8. See **Fig. 155** .



G00219450

Fig. 155: Installing Support Device & Adapters To Vehicle
Courtesy of VOLKSWAGEN UNITED STATES, INC.

NOTE: Do not remove the bolts for the carrier until the transmission has been supported. See **Fig. 156** .



Replace bolts.

Bolts -A- 60 Nm + 90°

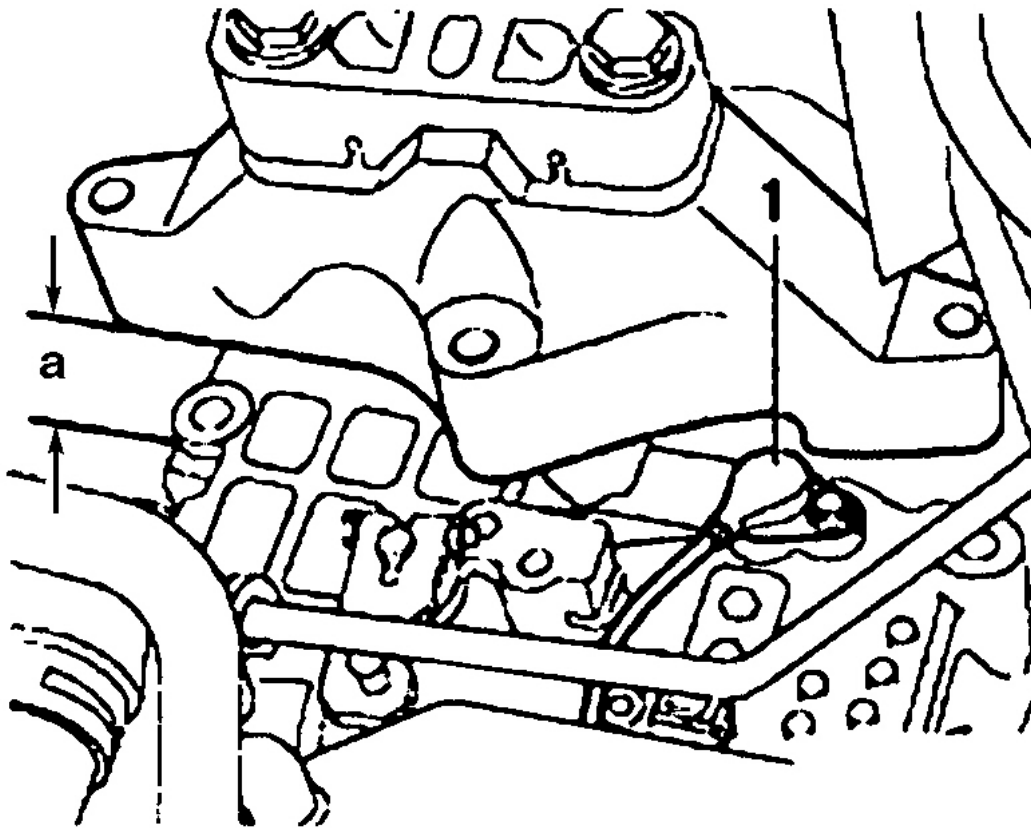
Bolts -B- 40 Nm + 90°

G00380813

Fig. 156: Identifying Transmisson-To-Body Bolt Torque Specifications
Courtesy of VOLKSWAGEN UNITED STATES, INC.

Remove pendulum support -A- and -B-. See **Fig. 158** .

Lower transmission approx. 60 mm -a-. See **Fig. 157** .



G00389938

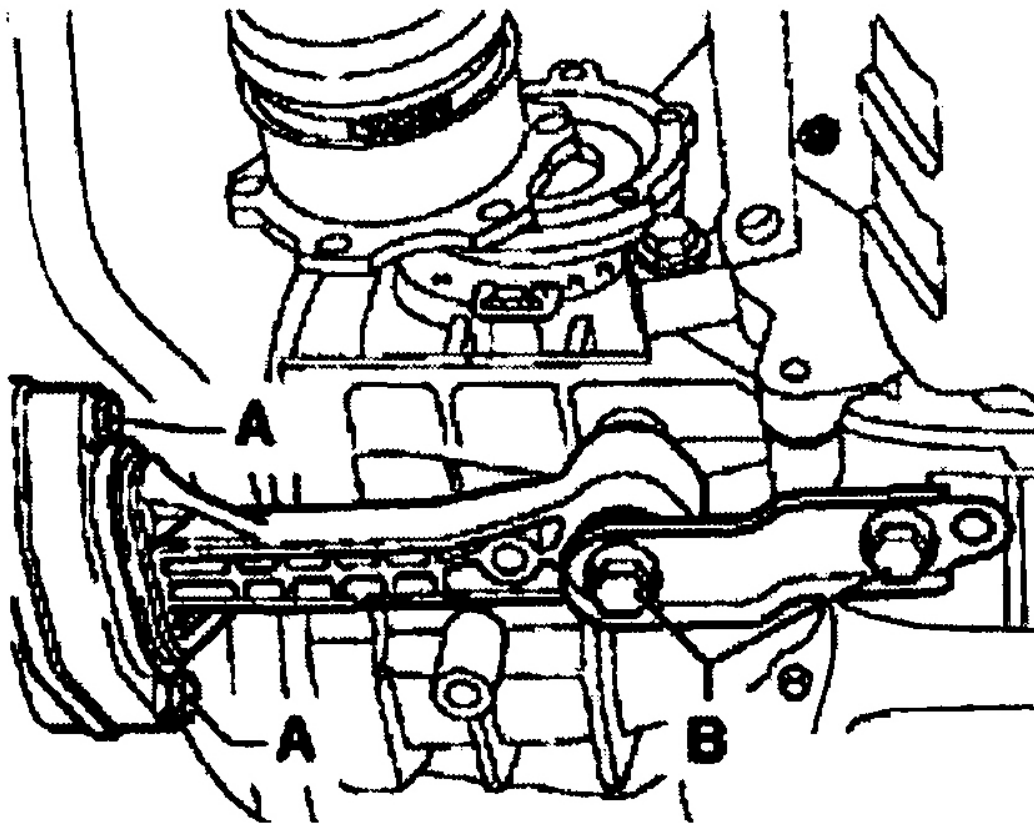
Fig. 157: Removing Vehicle Speed Sensor
Courtesy of VOLKSWAGEN UNITED STATES, INC.

Disconnect black connector from sensor.

Remove bolt and take sensor -1- out.

Replace seal.

Installation is performed in the reverse order of removal. Tighten bolt to 10 Nm. For pendulum support bolt torque specifications, see **Fig. 158** .



- Replace bolts

Bolts -A- 20 Nm + 90°

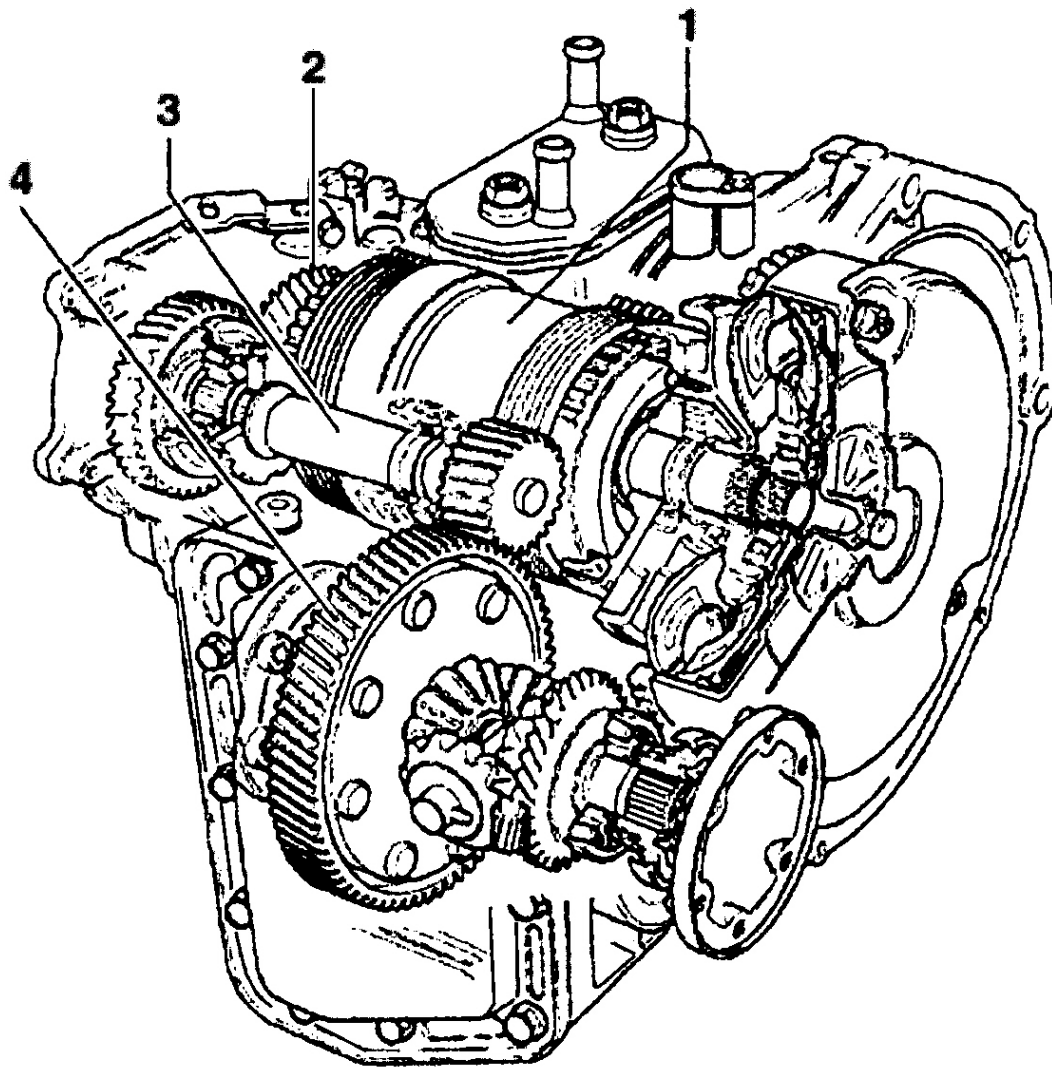
Bolts -B- 40 Nm + 90°

G00380814

Fig. 158: Identifying Pendulum Support Bolt Torque Specifications
Courtesy of VOLKSWAGEN UNITED STATES, INC.

FINAL DRIVE, DISASSEMBLING AND ASSEMBLING

REPAIR OVERVIEW OF FINAL DRIVE



Final drive, disassembling and assembling

Repair overview of final drive

1 - Planetary gear

2 - Input gear

- ◆ Repairs on the input gear can only be performed once the individual components of the transmission have been removed.

3 - Drive pinion

4 - Differential

Fig. 159: Overview Of Final Drive

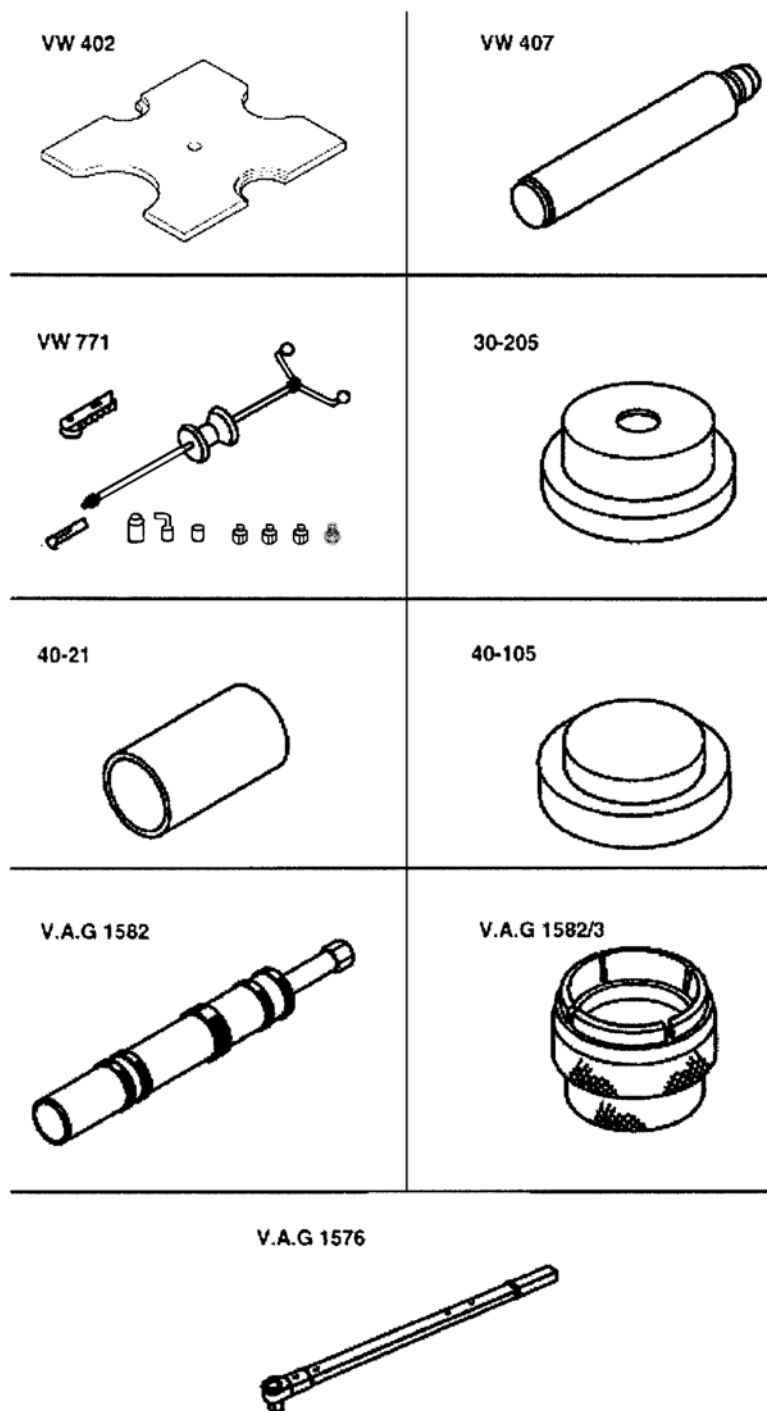
Courtesy of VOLKSWAGEN UNITED STATES, INC.

INPUT GEAR, REMOVING AND INSTALLING

Number of input gear teeth varies based on transmission code. For correct number used, see **CODE LETTERS, TRANSMISSION APPLICATION, RATIOS, EQUIPMENT** .

Special Tools And Equipment

- VW 402 Thrust plate
- VW 407 Press tool
- VW 771 Multi-purpose tool
- 30-205 Thrust plate
- 40-21 Press tool
- 40-105 Thrust plate
- VAG 1582 Tapered roller bearing puller
- VAG 1582/3 Grip
- VAG 1576 Torque wrench

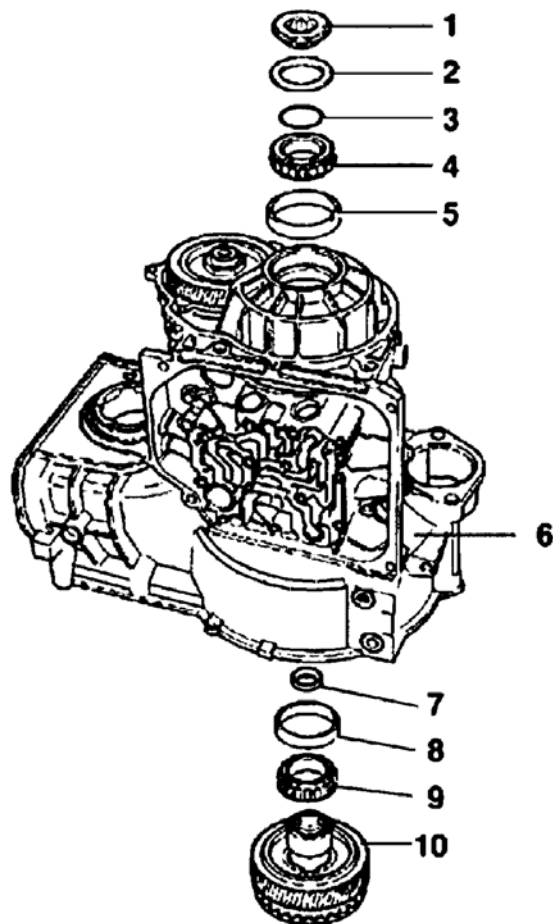


G00389952

Fig. 160: Identifying Input Gear Special Tools
 Courtesy of VOLKSWAGEN UNITED STATES, INC.

NOTE: For transmissions produced from 04.98, the tool for removing the tapered roller

bearings in the final drive and differential is VAG 1582/8.



Note:

Drive pinion and differential do not need to be removed.

1 - Socket head fastener, 250 Nm

- ◆ Engage parking lock to remove and install
- ◆ Use 22 mm wrench socket
- ◆ Before installing socket head fastener insert axial needle bearing (item - 7 -)

2 - Dished washer

- ◆ Curved side faces socket head fastener

3 - Shim

4 - Tapered roller bearing inner race

- ◆ After measuring thickness of shim, install onto input gear with locking fluid AMV 185 101 A1

5 - Tapered roller bearing outer race

- ◆ Drive out with drift
- ◆ Drive in with 30-205
- ◆ Insert with locking fluid AMV 185 101 A1

6 - Transmission housing

7 - Axial needle bearing

- ◆ Install with flat side facing input gear
- ◆ Insert into input gear before installing socket head fastener (item -1-)

8 - Tapered roller bearing outer race

- ◆ Drive out with drift
- ◆ Drive in with 30-205 and appropriately long drift
- ◆ Insert with locking fluid AMV 185 101 A1

9 - Tapered roller bearing inner race

- ◆ Insert with locking fluid AMV 185 101 A1

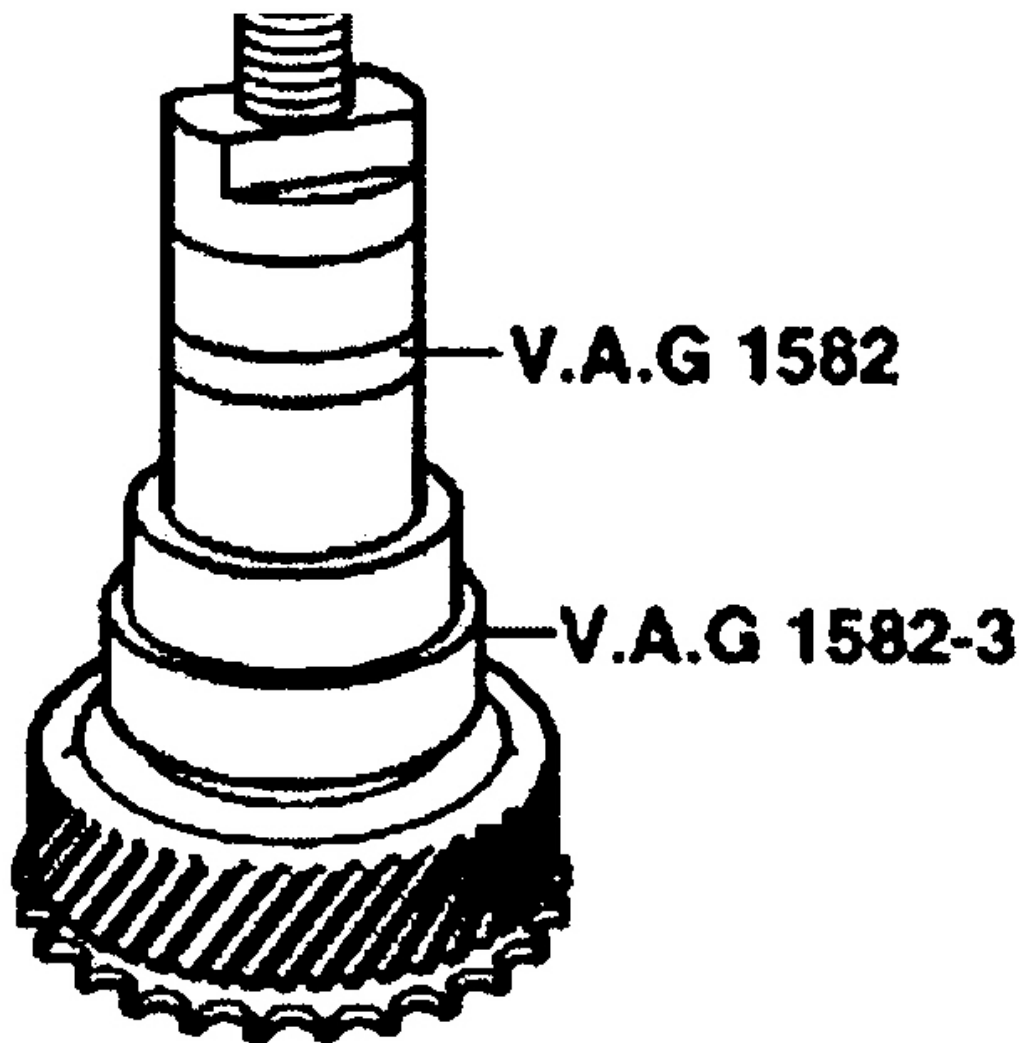
10 - Input gear

- ◆ With impulse wheel for vehicle speed sensor -G68-
- ◆ If signs of damage exist, always replace input gear and output gear together
- ◆ If input gear is replaced, adjust planet carrier

Fig. 161: Exploded View Of Input Gear Components
Courtesy of VOLKSWAGEN UNITED STATES, INC.

Pulling Off Tapered Roller Bearing Inner Race

Place thrust plate 40-105 on input gear. See **Fig. 162** .

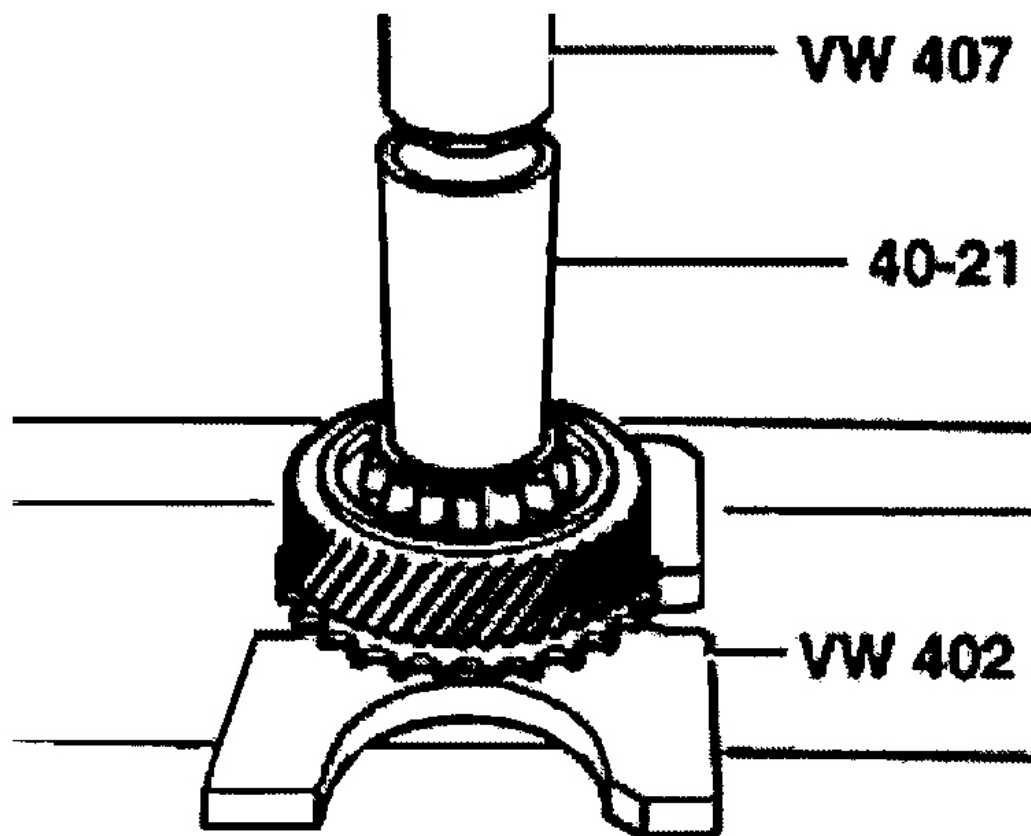


G00389954

Fig. 162: Pulling Off Tapered Roller Bearing Inner Race
Courtesy of VOLKSWAGEN UNITED STATES, INC.

Pressing On Tapered Roller Bearing Inner Race

A press piece must be placed below the hub of the input gear to avoid damage to the gear. See **Fig. 163** .

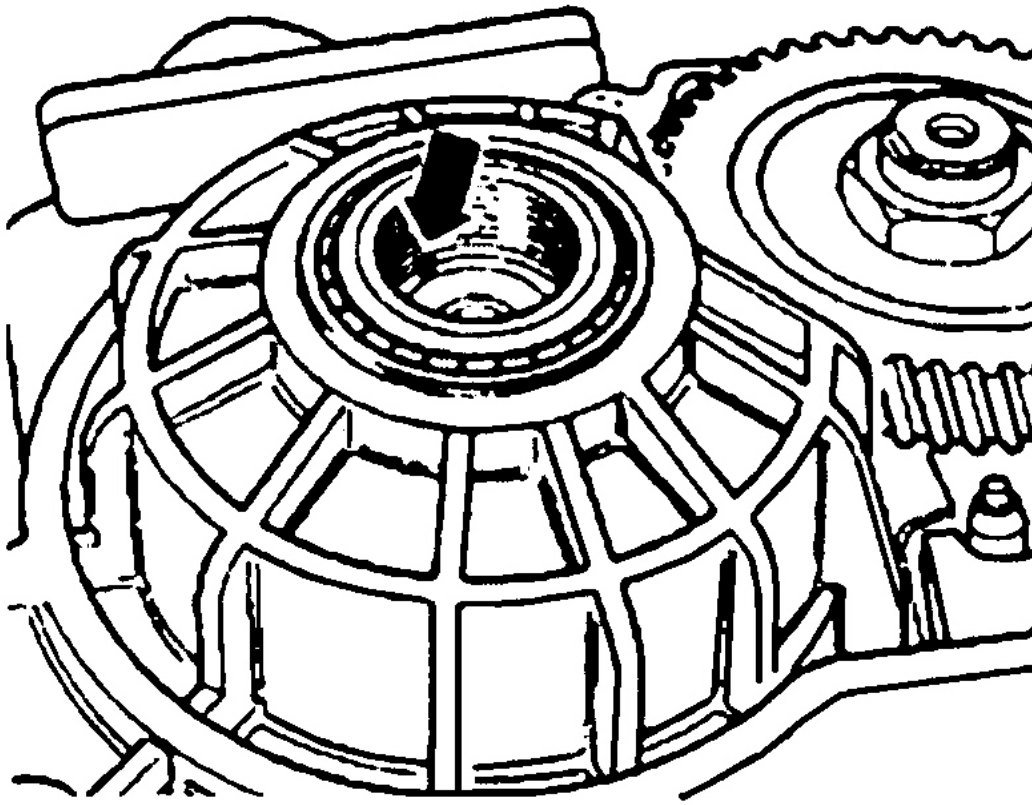


G00389955

Fig. 163: Pressing On Tapered Roller Bearing Inner Race
Courtesy of VOLKSWAGEN UNITED STATES, INC.

Inserting Tapered Roller Bearing Inner Race

Insert tapered roller bearing inner race with AMV 185 101 A1 -arrow-. See **Fig. 164** .

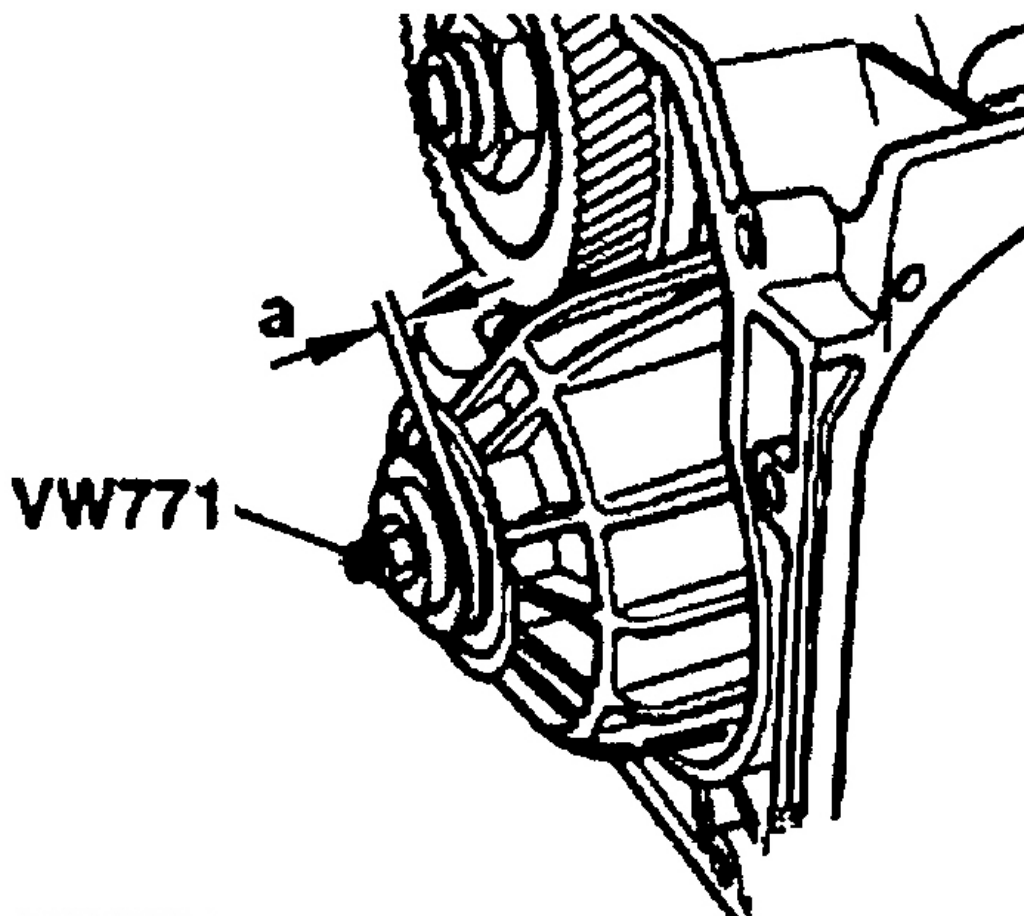


G00389956

Fig. 164: Inserting Tapered Roller Bearing Inner Race
Courtesy of VOLKSWAGEN UNITED STATES, INC.

Removing Input Gear

Insert socket head fastener without dished washer, shim and axial needle bearing far enough for gap size $a = 3$ mm to exist between socket head fastener and tapered roller bearing inner race. See **Fig. 165** .



G00389957

Fig. 165: Removing Input Gear

Courtesy of VOLKSWAGEN UNITED STATES, INC.

Drive out input gear with VW 771 as far as stop of tapered roller bearing inner race.

Remove VW 771 and take out input gear.

DRIVE PINION, REMOVING AND INSTALLING

Number of drive pinion and output gear teeth varies based on transmission code. For correct number used, see **CODE LETTERS, TRANSMISSION APPLICATION, RATIOS, EQUIPMENT** .

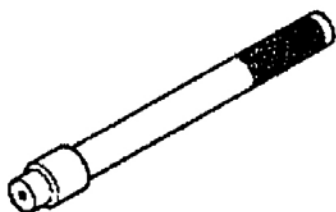
Special Tools And Equipment

- VW 295 Drift

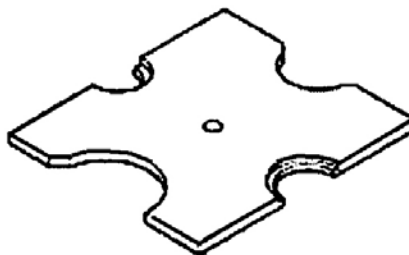
- VW 402 Thrust plate
- VW 408 A Press tool
- VW 432 Press piece
- VW 447 i Thrust plate
- VW 454 Press piece
- VW 510 Press piece
- VW 516 Tube
- 30-204 Installing ring
- 30-555 Thrust piece
- 32-109 Tube
- 40-203/ 1 Tube, split
- 3155 Ring nut spanner
- 3183 A Castellated box spanner
- 3274 Adapter
- VAG 1582 Tapered roller bearing puller
- VAG 1582/4 Grip
- Kukko 20-10 Puller
- V/172 Removal hook

NOTE: **For transmissions produced from 04.98, the tool for removing the tapered roller bearings in the final drive and differential is VAG 1582/8.**

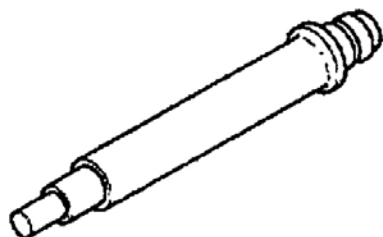
VW 295



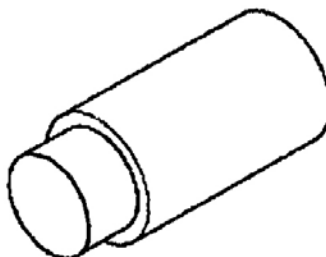
VW 402



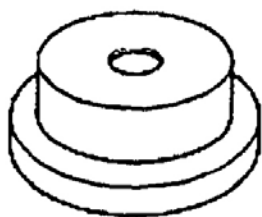
VW 408 A



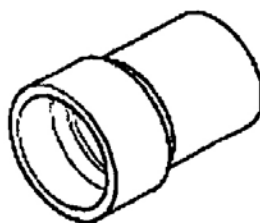
VW 432



VW 447 i



VW 454



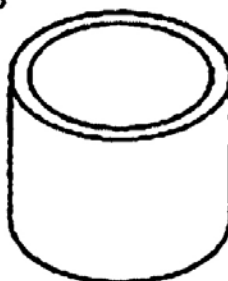
G00389958

Fig. 166: Identifying Drive Pinion Special Tools (1 Of 3)
Courtesy of VOLKSWAGEN UNITED STATES, INC.

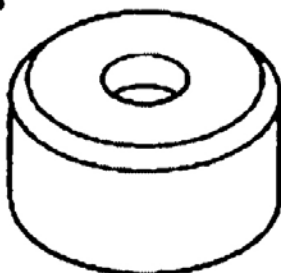
VW 510



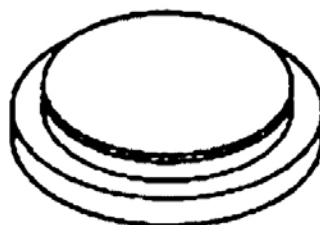
VW 516



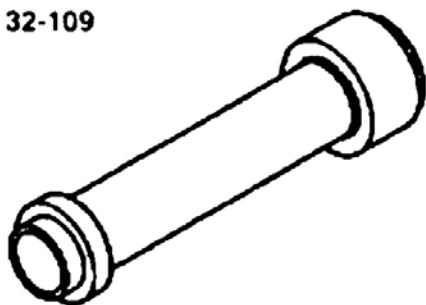
30-204



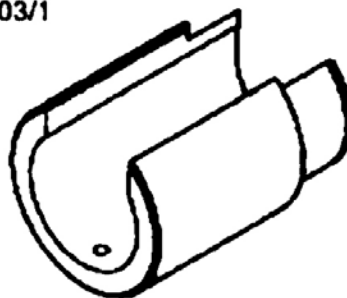
30-555



32-109



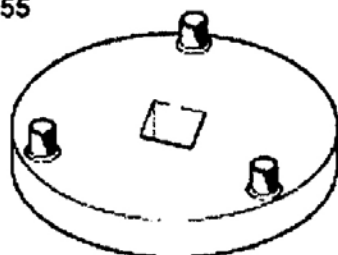
40-203/1



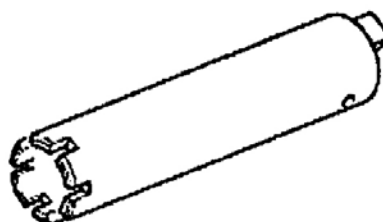
G00389959

Fig. 167: Identifying Drive Pinion Special Tools (2 Of 3)
Courtesy of VOLKSWAGEN UNITED STATES, INC.

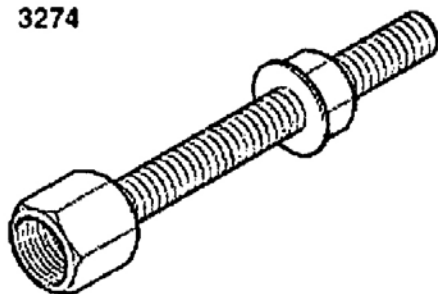
3155



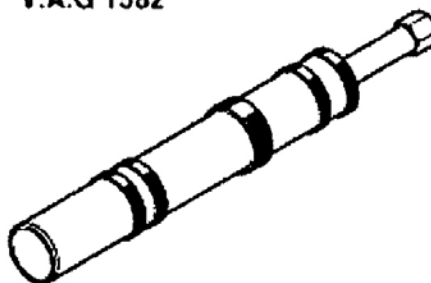
3183 A



3274



V.A.G 1582

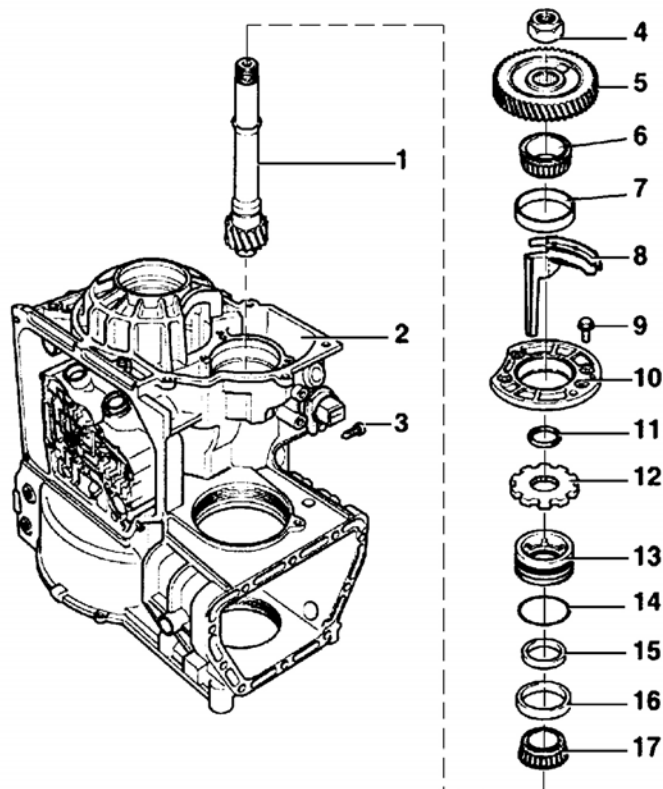


V.A.G 1582/4



G00389960

Fig. 168: Identifying Drive Pinion Special Tools (3 Of 3)
Courtesy of VOLKSWAGEN UNITED STATES, INC.



Note:

To remove the drive pinion, the selector shaft must be removed after taking out the parking lock.

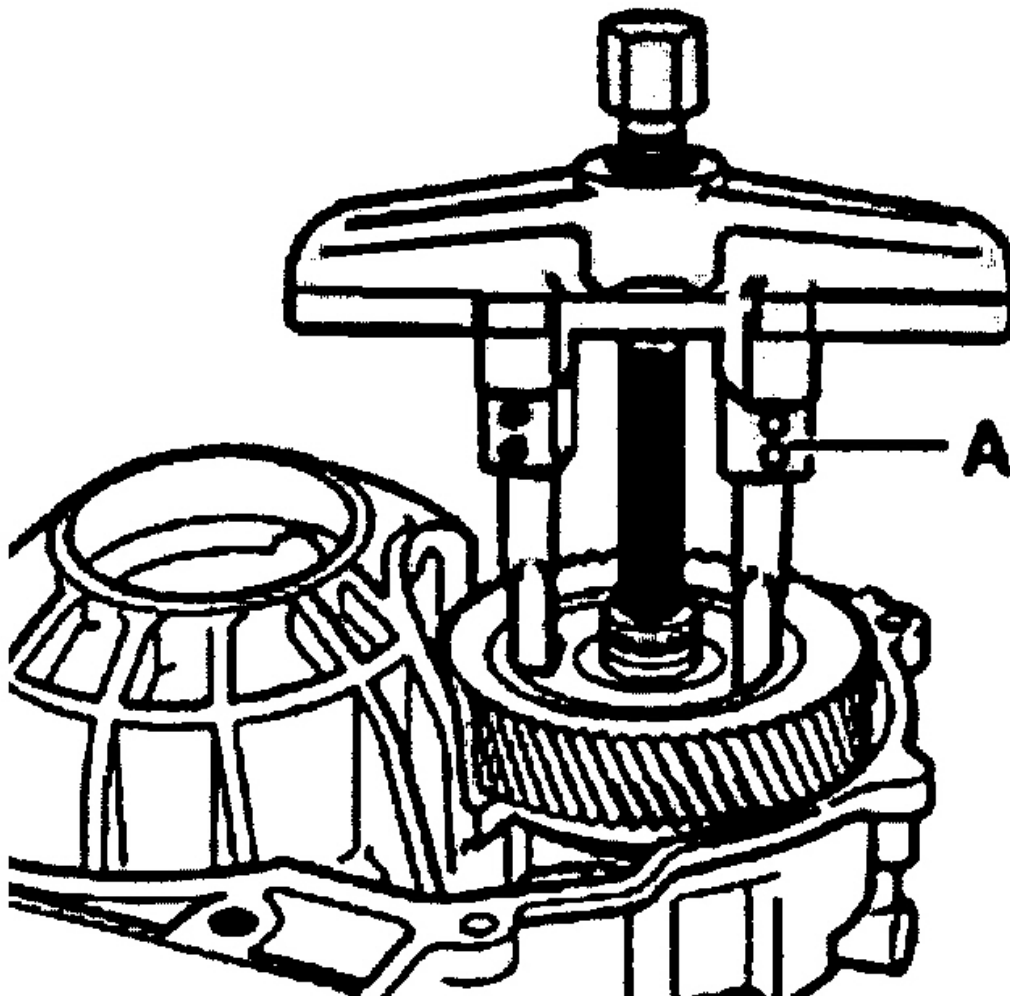
1. Drive Pinion
2. Transmission Housing
3. Screw, 12 Nm
Remove screw before removing or installing bearing supporting ring -item 13 -.
Insert with sealing agent AKD 456 000 01
4. Hex Nut, 250 Nm
Engage parking lock to remove or install
Secure with drift
5. Output Gear
If signs of damage exist, always replace input gear and output gear together
6. Tapered Roller Bearing Inner Race
7. Tapered Roller Bearing Outer Race
Drive out with drift
8. ATF oil deflector
Install together with bearing cap -item 10 -
9. Bolt, 25 Nm
10. Bearing Cap
11. Shim
12. Parking Lock Gear
Rounded side faces teeth of drive pinion
13. Bearing Supporting Ring, 200 Nm
Remove screw -item 3 - before removing or installing bearing supporting ring.
Bearing supporting ring cannot be unscrewed until selector shaft has been removed
Insert bearing supporting ring carefully. Sealing lip and spring must not be damaged.
14. O-Ring
Always replace
Place onto bearing supporting ring -item 13 -
15. Oil Seal For Drive Pinion
Remove with screwdriver
16. Tapered Roller Bearing Outer Race
17. Tapered Roller Bearing Inner Race
Drive off with drift

G00389961

Fig. 169: Exploded View Of Drive Pinion Components
Courtesy of VOLKSWAGEN UNITED STATES, INC.

Pulling Off Output Gear

A - Kukko 20-10 and Matra V 172 pulling hooks. See **Fig. 170** .



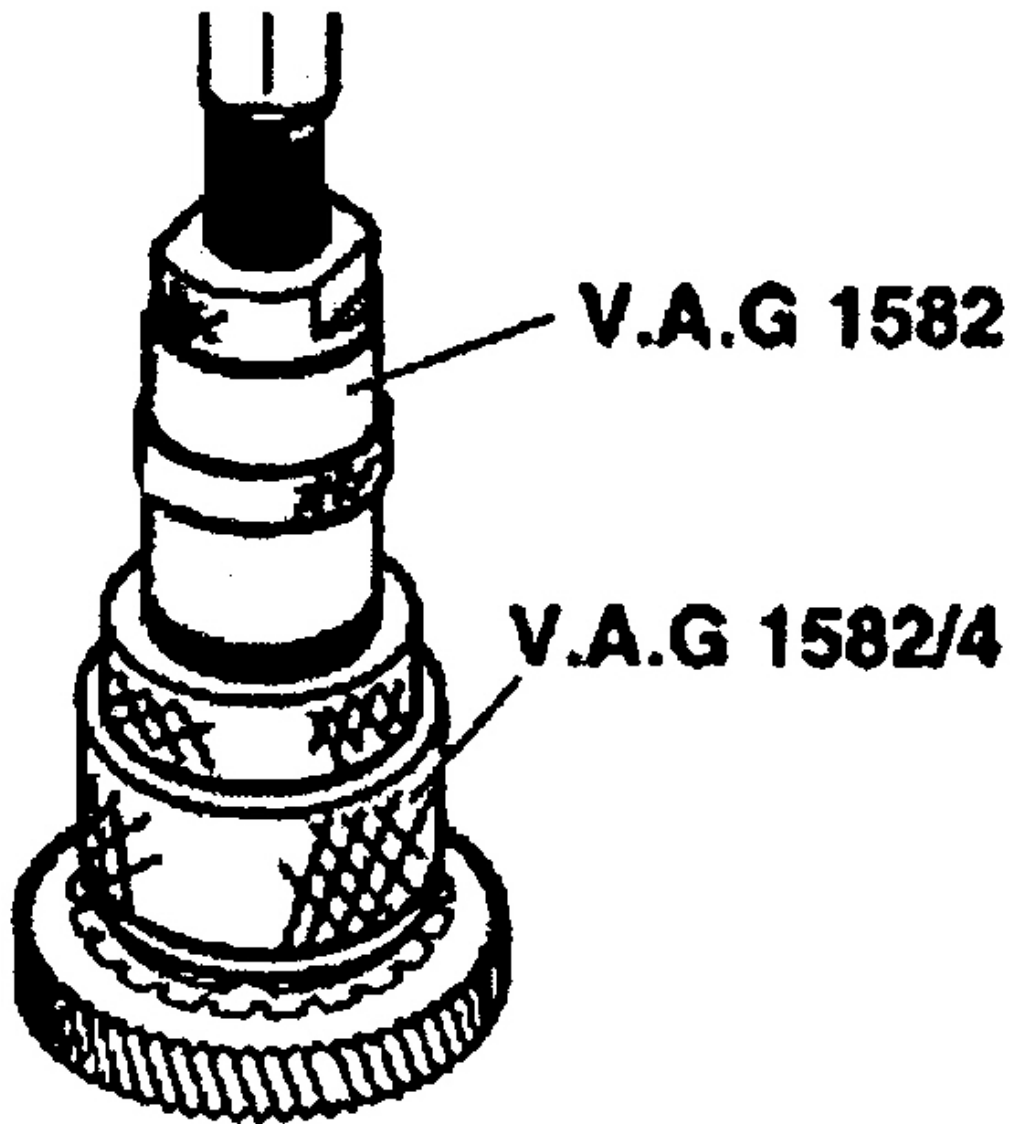
G00389962

Fig. 170: Pulling Off Output Gear

Courtesy of VOLKSWAGEN UNITED STATES, INC.

Pulling Off Tapered Roller Bearing Inner Race

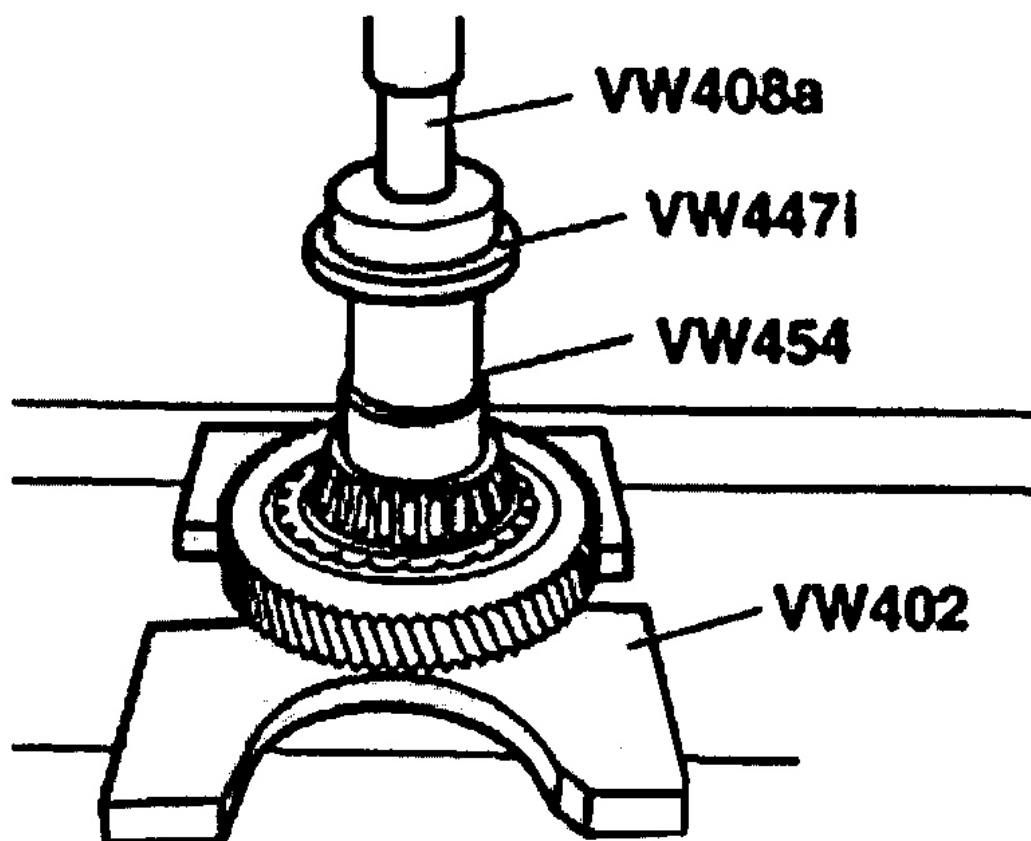
Place press piece onto collar of output gear. See **Fig. 171** .



G00389963

Fig. 171: Pulling Off Tapered Roller Bearing Inner Race
Courtesy of VOLKSWAGEN UNITED STATES, INC.

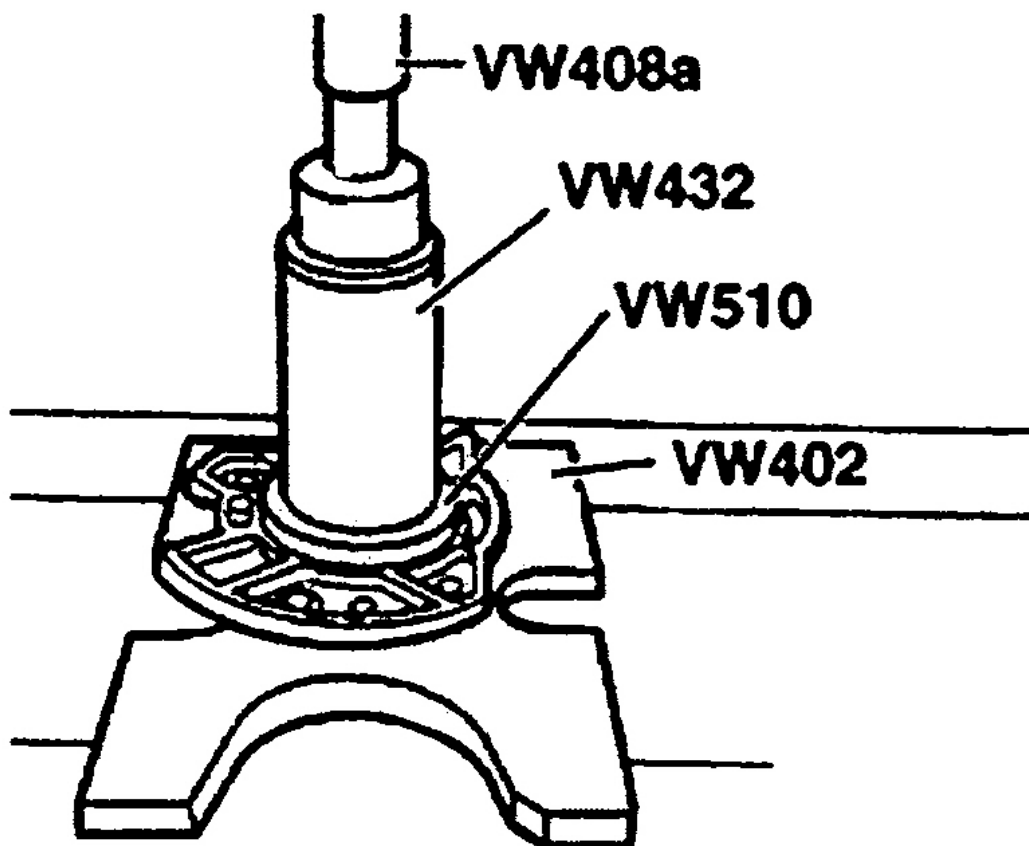
Pressing On Tapered Roller Bearing Inner Race



G00389964

Fig. 172: Pressing On Tapered Roller Bearing Inner Race
Courtesy of VOLKSWAGEN UNITED STATES, INC.

Pressing In Tapered Roller Bearing Outer Race

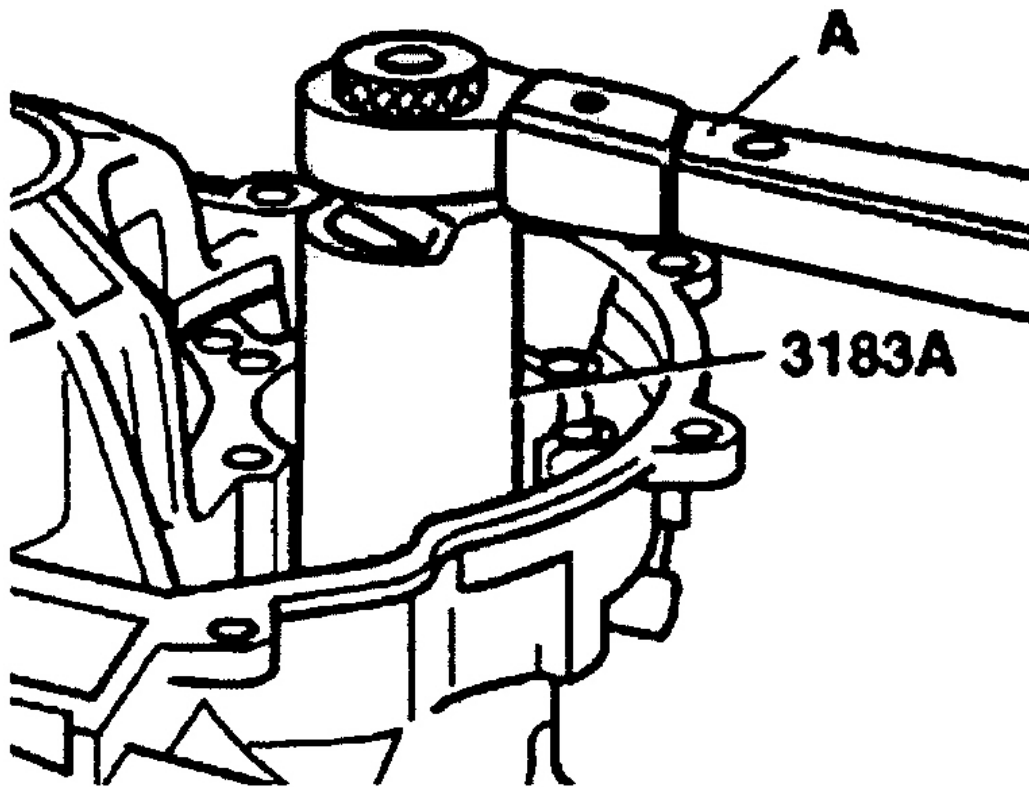


G00389965

Fig. 173: Pressing In Tapered Roller Bearing Outer Race
Courtesy of VOLKSWAGEN UNITED STATES, INC.

Removing & Installing Bearing Supporting Ring

Remove locking bolt. See **Fig. 174** .



G00389966

Fig. 174: Removing & Installing Bearing Supporting Ring
Courtesy of VOLKSWAGEN UNITED STATES, INC.

A - Torque wrench

Tighten bearing supporting ring to 200 Nm and secure with locking screw. Insert screw with AKD 456 000 01.

Bearing Supporting Ring W/Seal For Drive Pinion

Installation position of seal: See **Fig. 175** .

Open side (arrow) faces tapered roller bearing outer race.

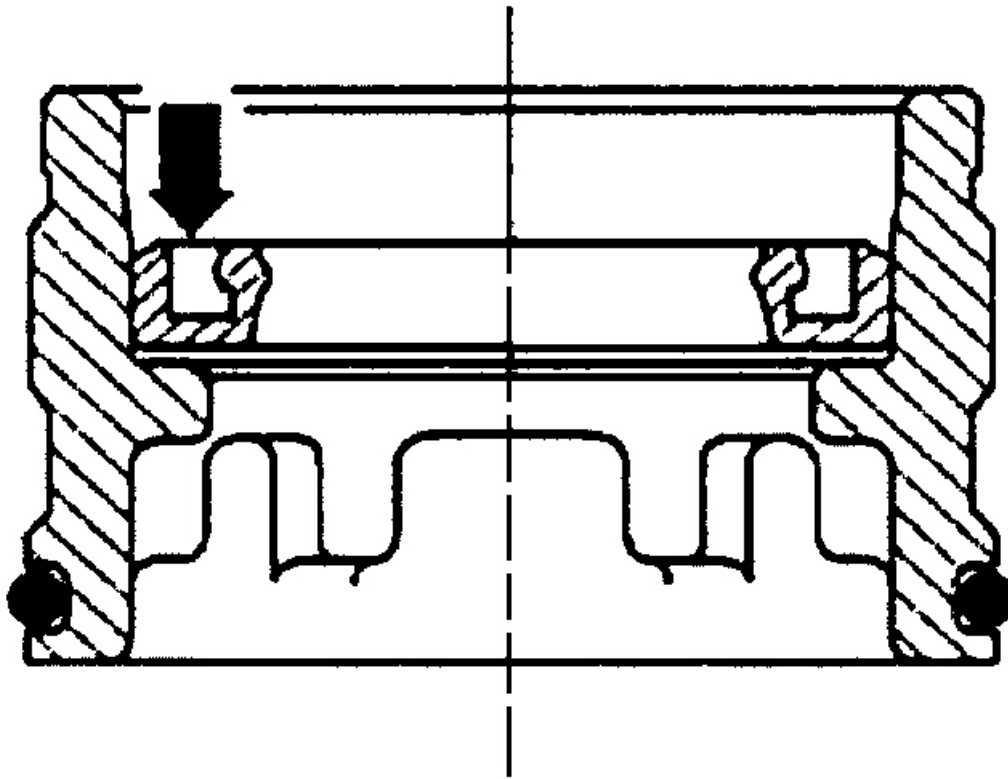
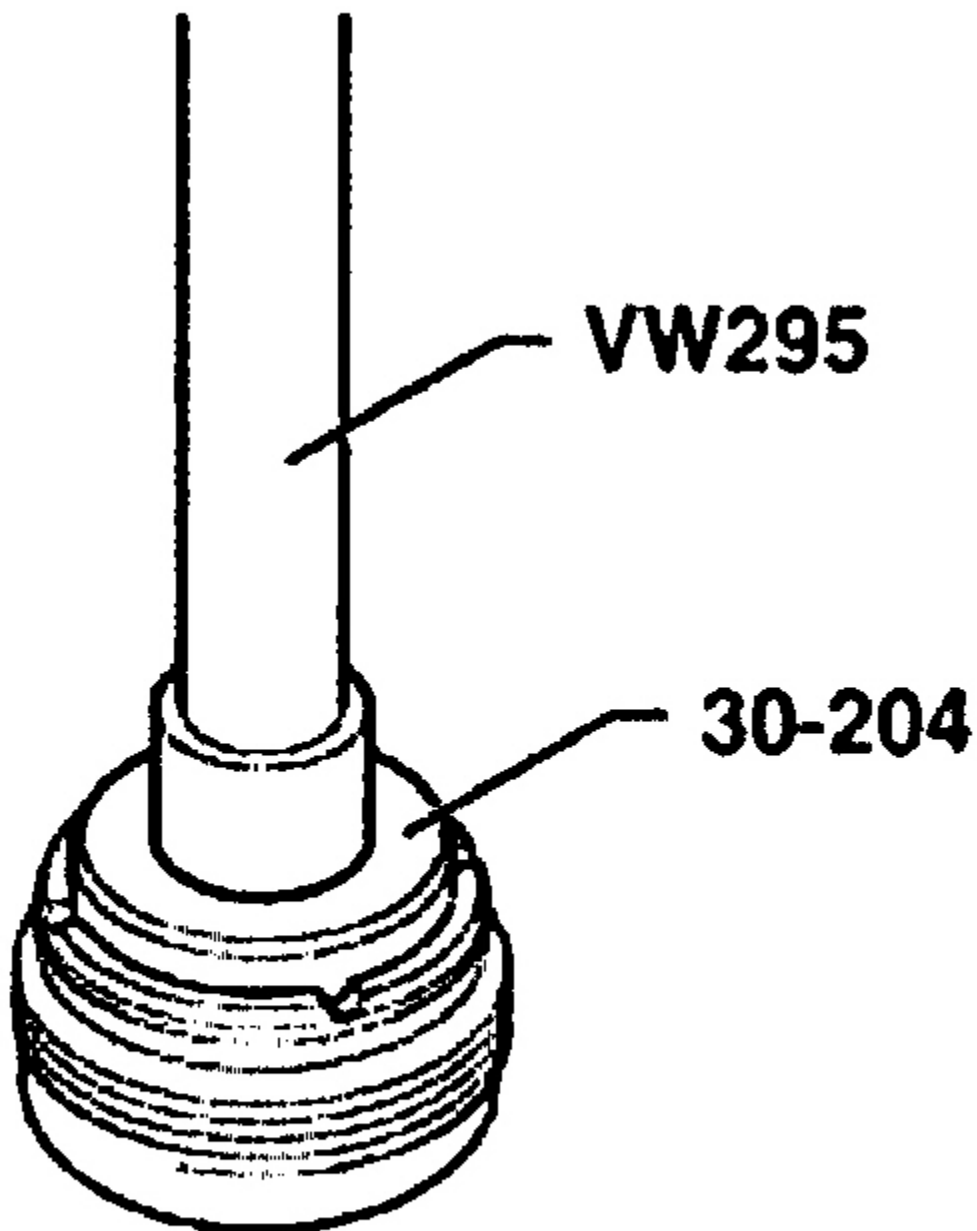


Fig. 175: Bearing Supporting Ring W/Seal For Drive Pinion
Courtesy of VOLKSWAGEN UNITED STATES, INC.

Driving In Drive Pinion Oil Seal

Insert oil seal so that sealing lip faces outward to special tool 30-204. See **Fig. 176**.



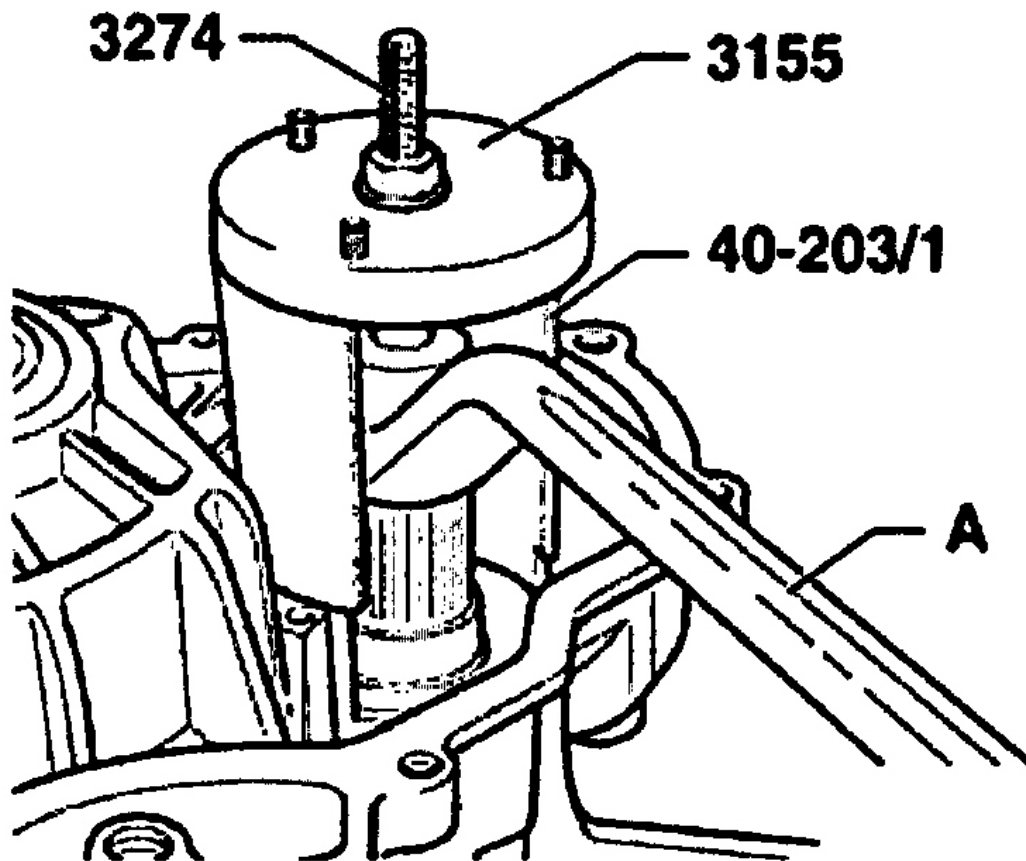
G00389968

Fig. 176: Driving In Drive Pinion Oil Seal

Courtesy of VOLKSWAGEN UNITED STATES, INC.

Removing Drive Pinion

A - Ring spanner 32 mm. See **Fig. 177** .



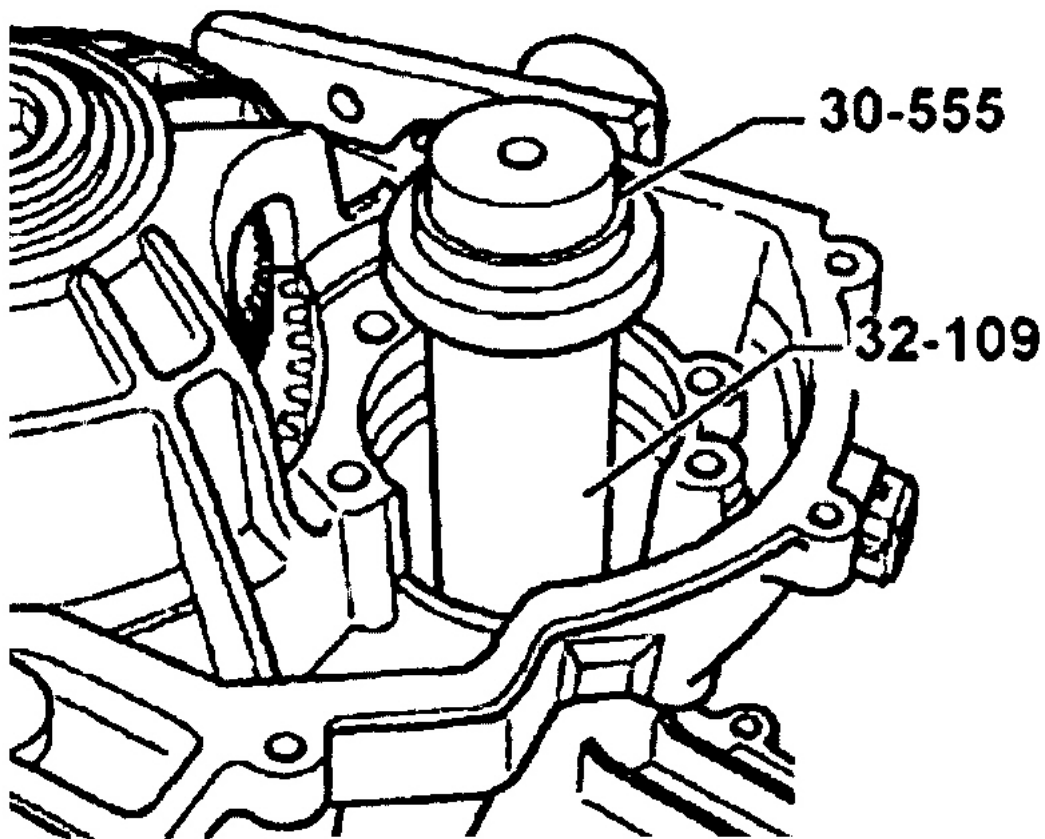
G00389969

Fig. 177: Removing Drive Pinion

Courtesy of VOLKSWAGEN UNITED STATES, INC.

Driving In Tapered Roller Bearing Outer Race

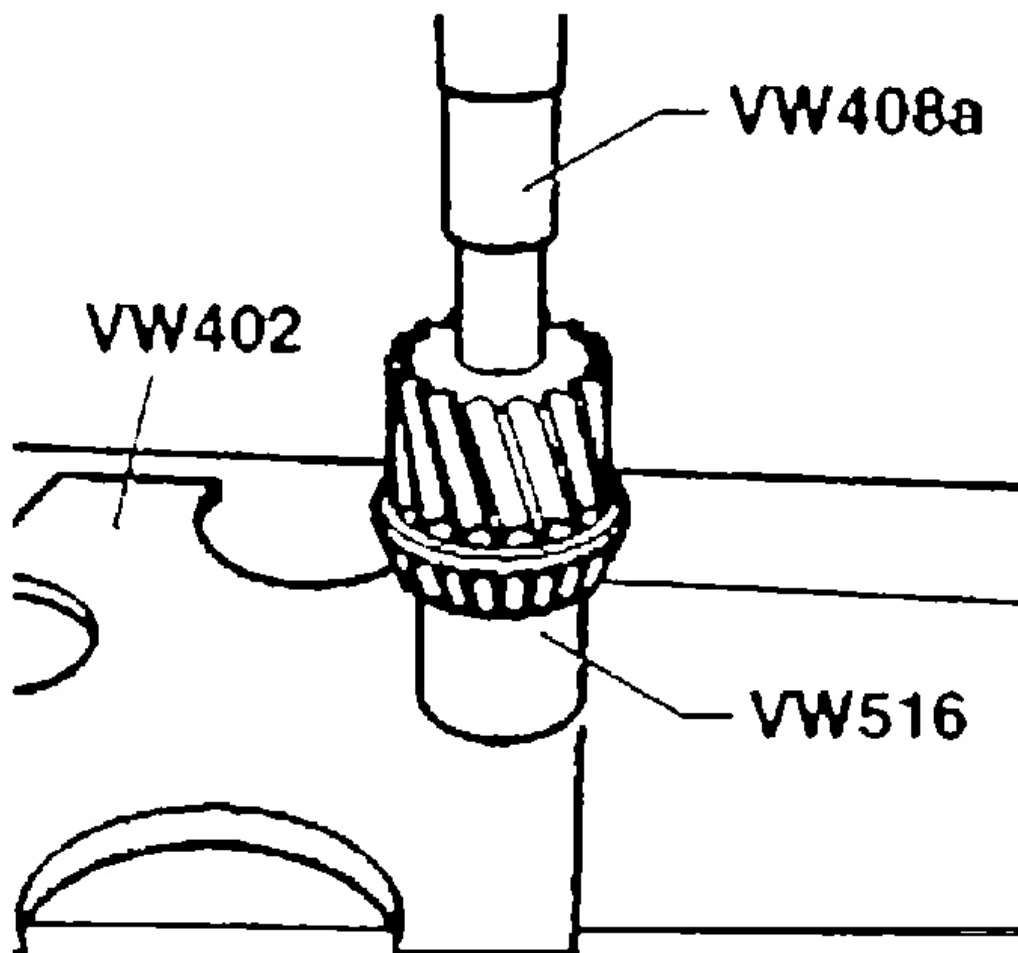
Insert drive pinion with tapered roller bearing inner race, then drive in outer race. See **Fig. 178** .



G00389970

Fig. 178: Driving In Tapered Roller Bearing Outer Race
Courtesy of VOLKSWAGEN UNITED STATES, INC.

Pressing On Tapered Roller Bearing Inner Race



G00389971

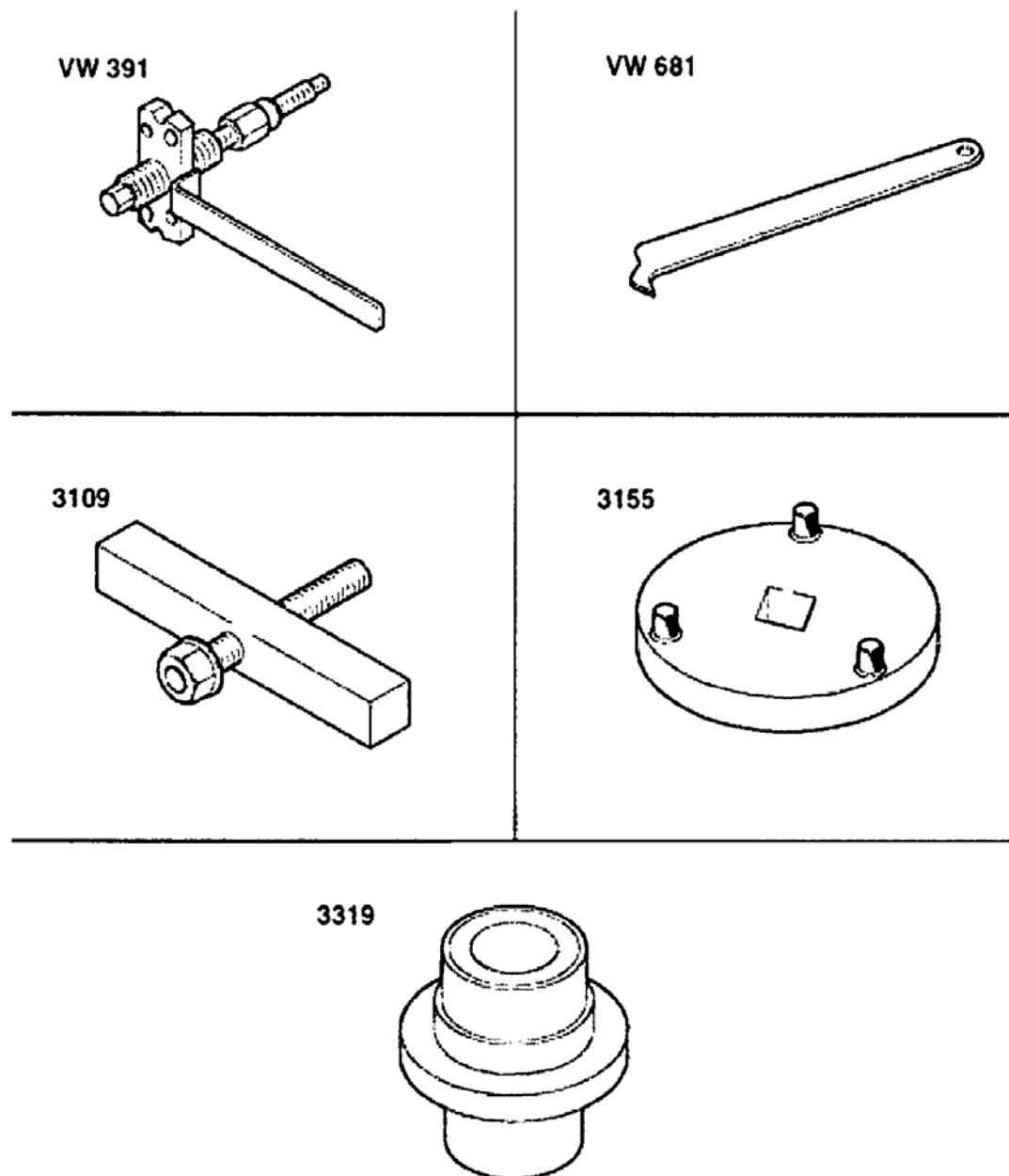
Fig. 179: Pressing On Tapered Roller Bearing Inner Race
Courtesy of VOLKSWAGEN UNITED STATES, INC.

DIFFERENTIAL, REMOVING AND INSTALLING

Special Tolls And Equipment

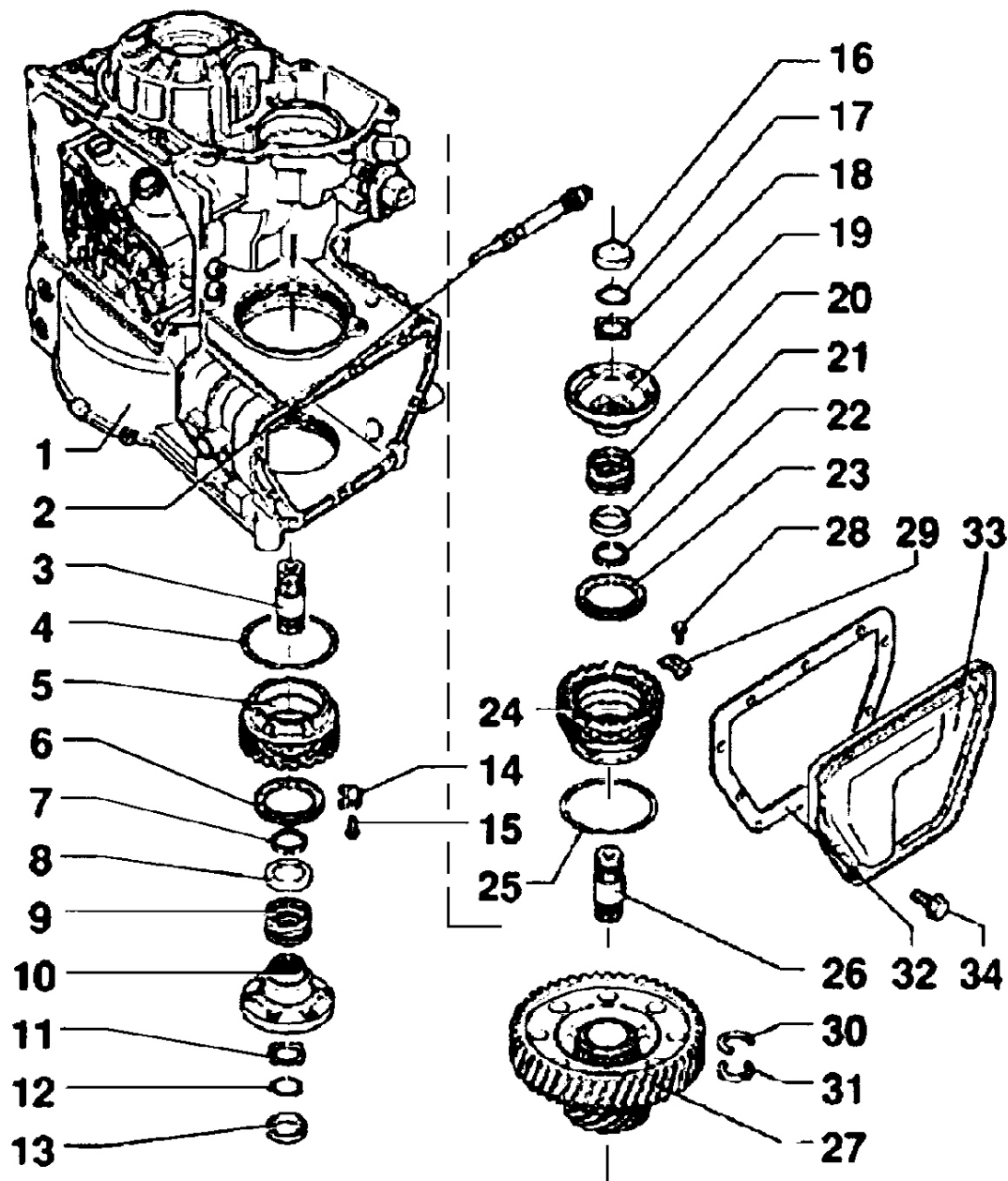
- VW 391 Drive shaft fitting appliance
- VW 681 Oil seal extractor
- 3109 Puller
- 3155 Ring nut spanner

- 3319 Thrust piece



G00389972

Fig. 180: Identifying Differential Special Tools
Courtesy of VOLKSWAGEN UNITED STATES, INC.



G00389973

Fig. 181: Exploded View Of Differential Assembly
 Courtesy of VOLKSWAGEN UNITED STATES, INC.

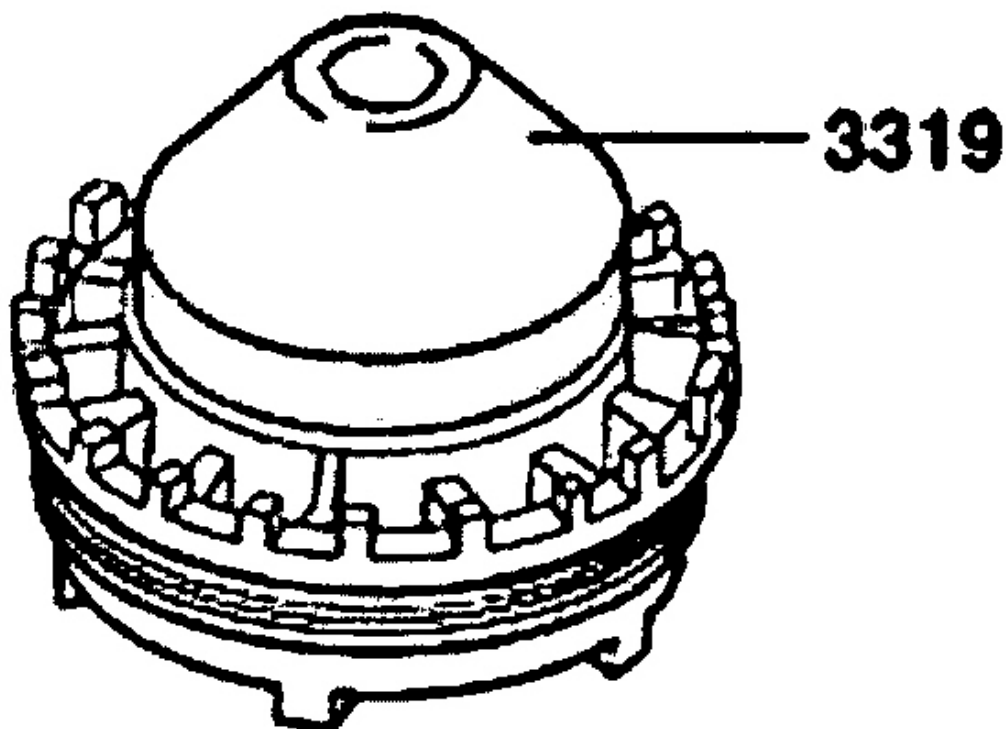
Note: If tapered roller bearings are to be re-used, mark the adjusting ring. The drive pinion does not need to be removed for removing and installing the differential.

1. Transmission Housing
2. Speedometer Drive
3. Output Shaft/Drive Flange
Install thread facing drive flange
Remove before taking out differential
First adjust differential before installing
4. O-Ring (Always replace)
5. Adjusting Ring
If used bearings are re-installed, mark installation position
and position on marking again when installing.
When installing new bearing, pay attention to setting instructions
6. Oil Seal For Drive Flange
Before installing, pack space between sealing lips with multi-purpose grease
Can be replaced with transmission installed
Remove with VW 681
7. Tapered Ring
Shoulder faces thrust washer
8. Thrust Washer
Place over compression spring
9. Compression Spring
10. Drive Flange
Insert with tapered ring, thrust washer and compression spring
Remove before taking out inner circlip on bevel gear
11. Dished Washer
12. Circlip
13. Cover
14. Locking Element
15. Screw, 12 Nm
16. Cover
17. Circlip
18. Dished Washer
19. Drive Flange
Insert with tapered ring, thrust washer and compression spring
Remove before taking out inner circlip on bevel gear
20. Compression Spring
21. Thrust Washer
Place over compression spring
22. Tapered Ring
Shoulder faces thrust washer
23. Oil Seal For Drive Flange
Before installing, pack space between sealing lips with multi-purpose grease
Can be replaced with transmission installed
Remove with VW 681
24. Bearing Body, 150 Nm
When installing new bearing, pay attention to setting instructions.
25. O-ring (Always replace)
26. Output Shaft/Drive Flange
Install thread facing drive flange
Before removing, take out differential
First adjust differential before installing
27. Differential
Before removing differential, take out bearing body, adjusting ring and output shafts
28. Screw, 12 Nm
29. Locking Element
After adjusting tapered roller bearings, secure bearing body and adjusting ring.
30. Circlip
First remove drive flange before removing circlip
31. Circlip
First remove drive flange before removing circlip
32. Seal (Always replace)
33. Cover (For differential)
34. Screw, 28 Nm
Insert with locking fluid AMV 185 101 A1

G00389973

Fig. 182: Exploded View Of Differential Assembly Legend
Courtesy of VOLKSWAGEN UNITED STATES, INC.

Driving In Drive Flange Oil Seal Up To Stop

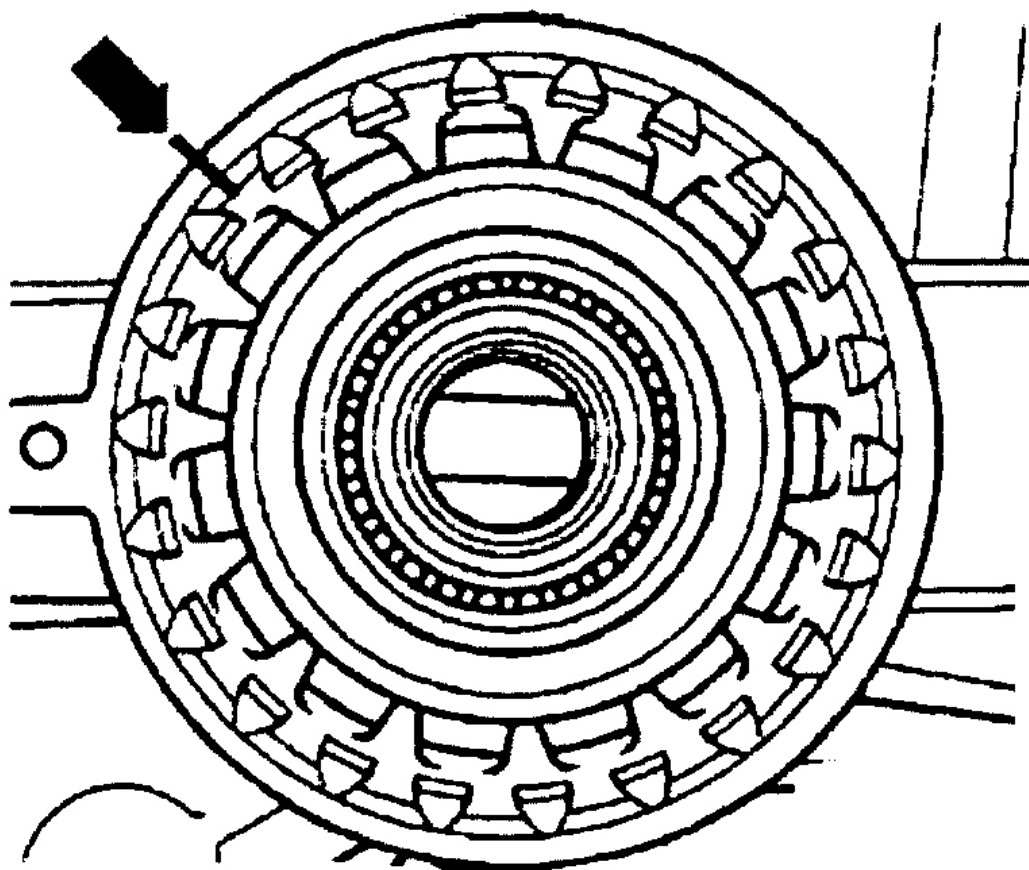


G00389975

Fig. 183: Driving In Drive Flange Oil Seal Up To Stop
Courtesy of VOLKSWAGEN UNITED STATES, INC.

Marking Adjusting Ring

If used bearings are re-installed, mark installation position (arrow) and again position on marking when installing. See **Fig. 184** .

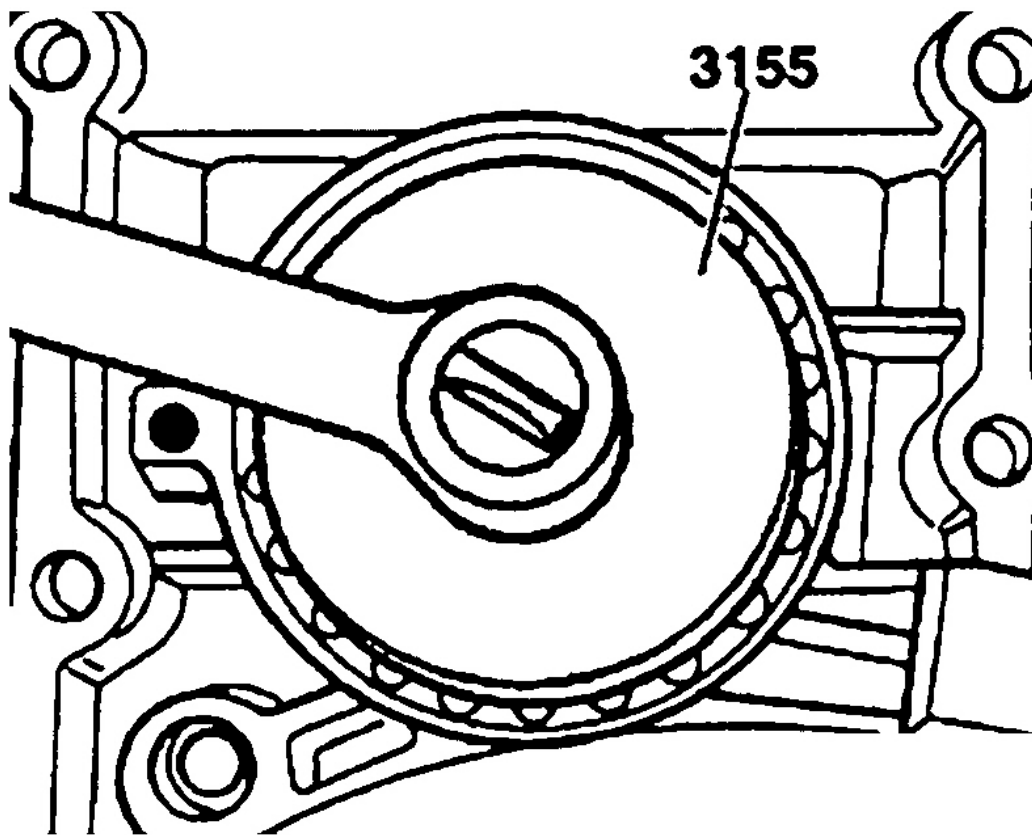


G00389976

Fig. 184: Marking Adjusting Ring

Courtesy of VOLKSWAGEN UNITED STATES, INC.

Removing Adjusting Ring

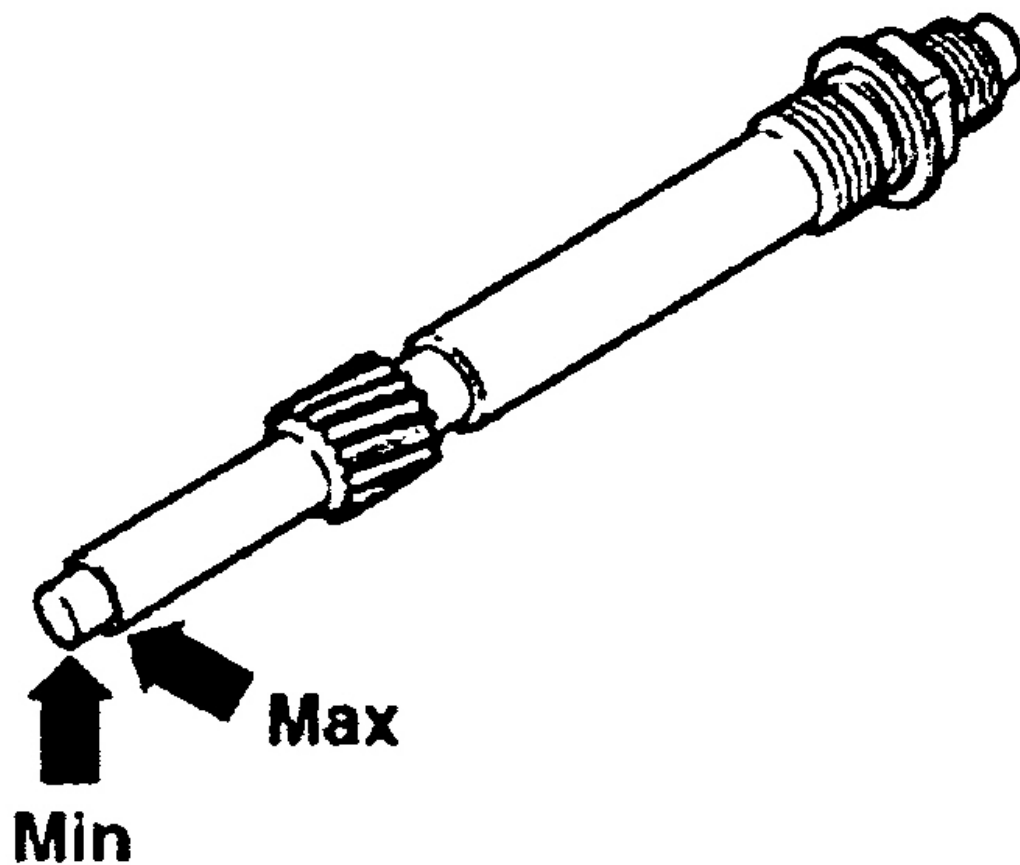


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Fig. 185: Removing Adjusting Ring
Courtesy of VOLKSWAGEN UNITED STATES, INC.

Speedometer Drive

With transmission installed, check gear oil in final drive. See **SERVICING - A/T (01M)** article.

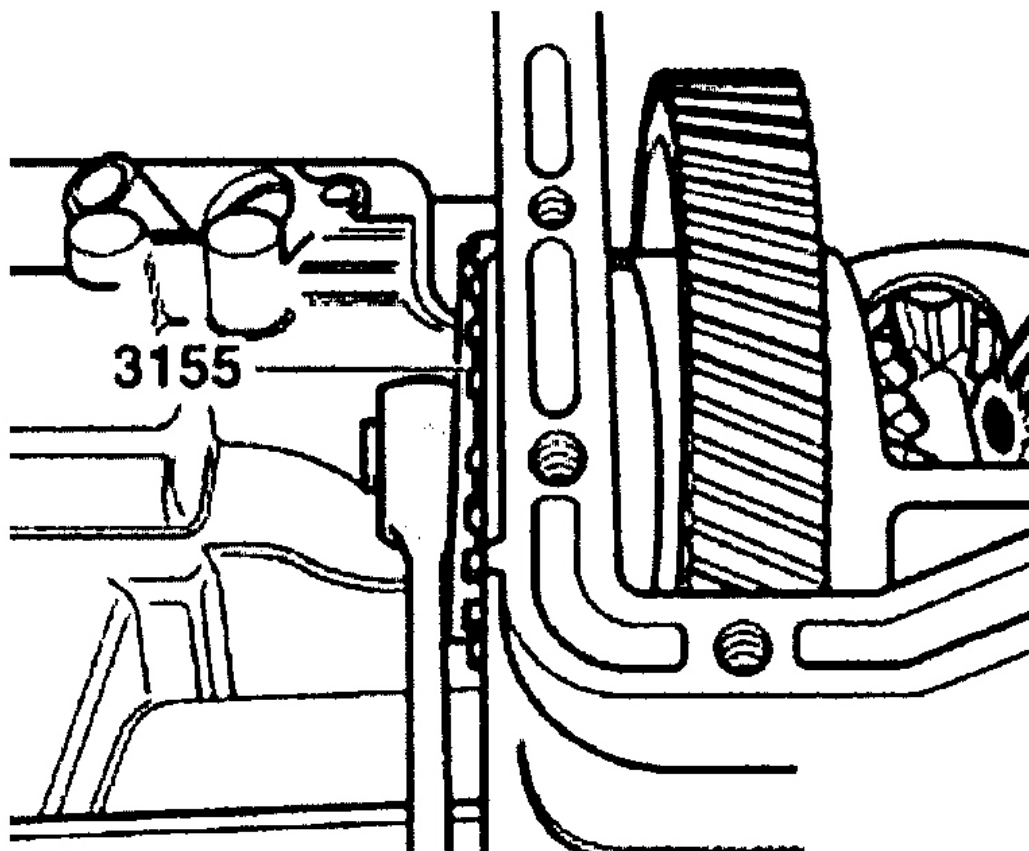


G00389978

Fig. 186: Identifying Speedometer Drive
Courtesy of VOLKSWAGEN UNITED STATES, INC.

Inserting Differential

Insert differential and screw in bearing body as far as stop to 150 Nm. See **Fig. 187** .



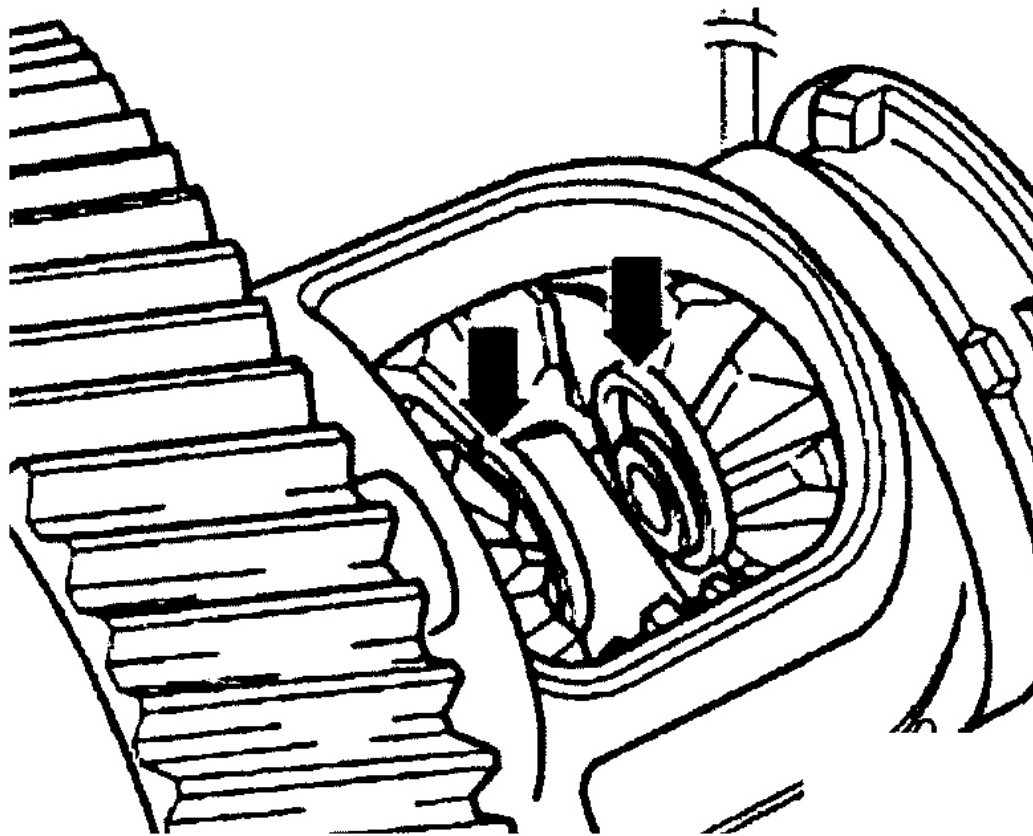
G00389979

Fig. 187: Inserting Differential

Courtesy of VOLKSWAGEN UNITED STATES, INC.

Inserting Circlip

Remove circlip (arrows) with two screwdrivers. See **Fig. 188** .



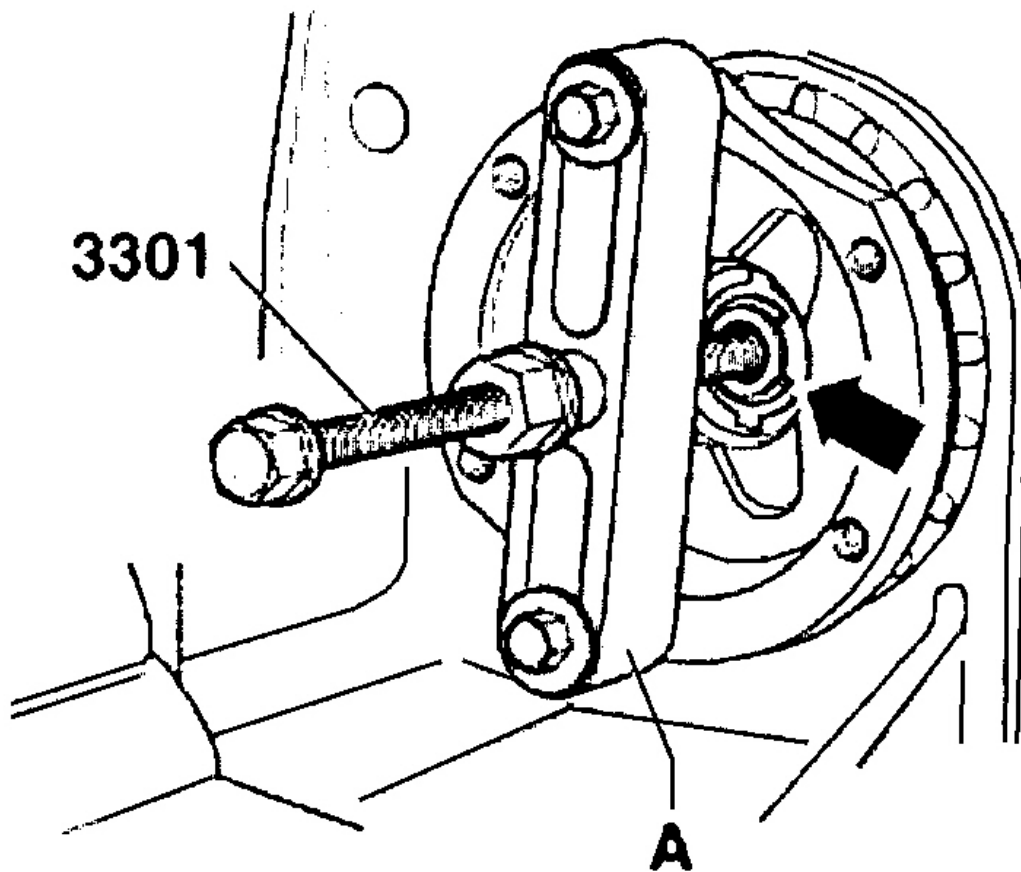
G00389980

Fig. 188: Inserting Circlip

Courtesy of VOLKSWAGEN UNITED STATES, INC.

Removing And Installing Securing Ring For Drive Flange

Screw spindle out of bridge -A- on puller Kukko 18-0. See **Fig. 189** .



G00389981

Fig. 189: Removing & Installing Drive Flange Securing Ring
 Courtesy of VOLKSWAGEN UNITED STATES, INC.

Insert spindle with nut from assembly tool 3301 instead.

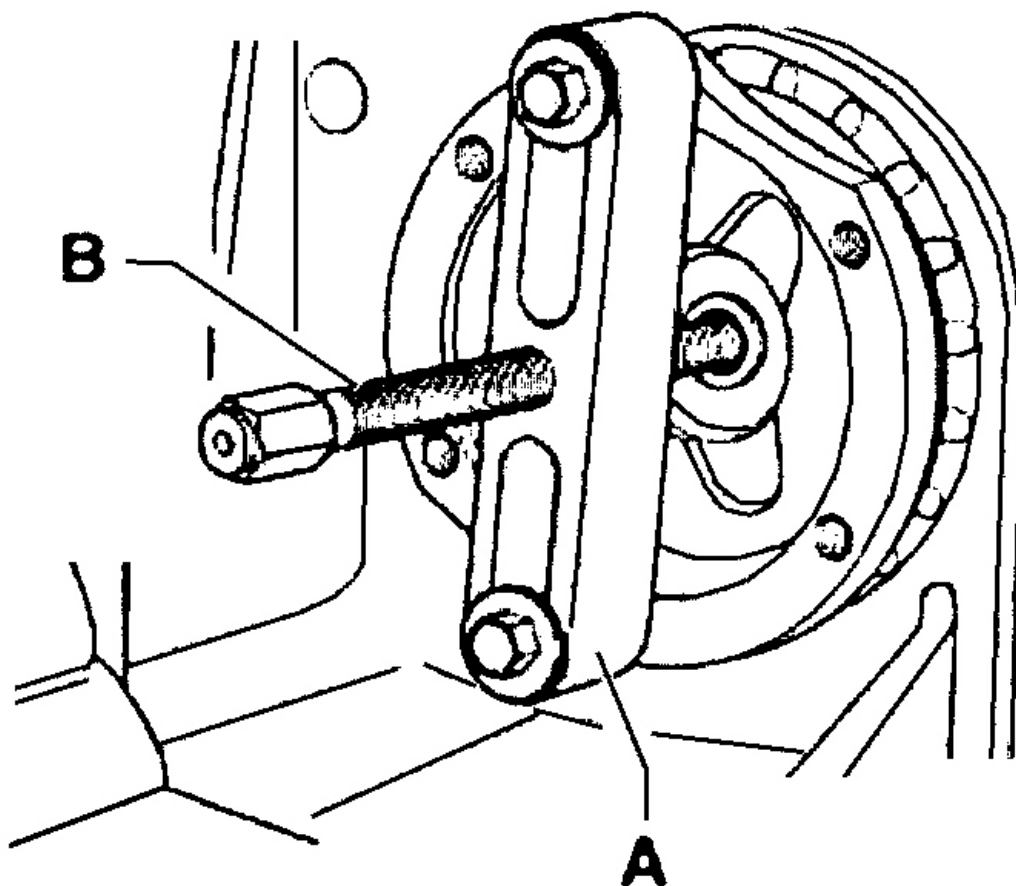
Bolt puller Kukko 18-0 to flange using two 8x35 mm bolts and 8 mm diameter washers.

Remove securing ring -arrow- for drive flange

Removing And Installing Drive Flange

Removing

Bolt puller Kukko 18-0 to flange using two 8x35 mm bolts and 8 mm diameter washers. See **Fig. 190** .



G00389982

Fig. 190: Removing & Installing Drive Flange
Courtesy of VOLKSWAGEN UNITED STATES, INC.

Pull off drive flange.

NOTE: Drive flange for triple roller shaft with 108 mm flange diameter can also be pulled off with assembly tool VW 391.

Installing

Secure puller 18-0 on drive flange. See **Fig. 190** .

Exchange spindle -B- from Kukko 18-0 for spindle with nut from assembly tool 330. See **Fig. 189** .

Pull in drive flange.

NOTE: Drive flange can also be pulled in with VW 391.

DIFFERENTIAL, DISASSEMBLING AND ASSEMBLING

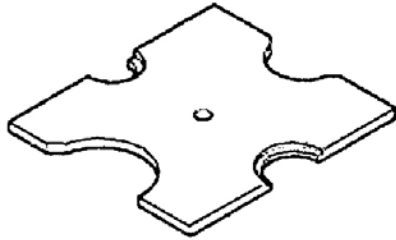
Number of teeth on final drive gear vary based on transmission code. For correct number used, see **CODE LETTERS, TRANSMISSION APPLICATION, RATIOS, EQUIPMENT** .

Special Tools And Equipment

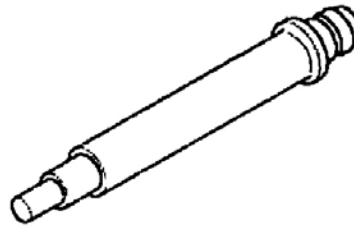
- VW 402 Thrust plate
- VW 408 A Press tool
- VW 411 Press tool
- 30-205 Thrust plate
- 40-21 Press tool
- VAG 1582 Tapered roller bearing puller
- VW 191
- VW 472/1 Thrust piece
- VW 472/2 Thrust piece
- VW 792 Thrust piece
- 3347 Assembly tool
- 2010
- VW 433 Thrust piece
- VAG 1582/6 Grip
- VAG 1582/6A Grip
- VAG 1582/11 Grip
- Kukko 21/7 Internal puller
- Kukko 22/2 Counter-support
- VAG 1582/3 Clamping ring
- 30-555 Thrust piece

NOTE: For transmissions produced from 04.98, the tool for removing the tapered roller bearings in the final drive and differential is VAG 1582/8.

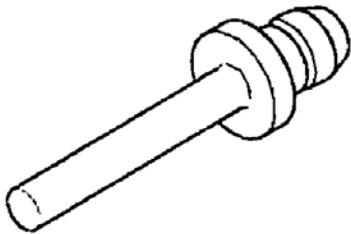
VW 402



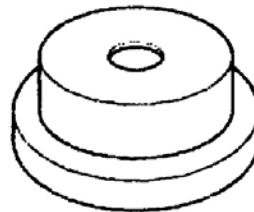
VW 408 A



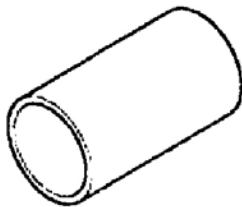
VW 411



30-205



40-21



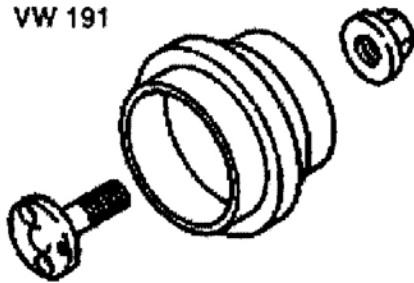
V.A.G 1582



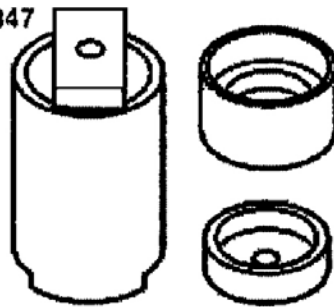
G00389983

Fig. 191: Identifying Differential Disassembly & Assembly Special Tools (1 Of 3)
Courtesy of VOLKSWAGEN UNITED STATES, INC.

VW 191



3347



VW 472/1



VW 472/2



2010



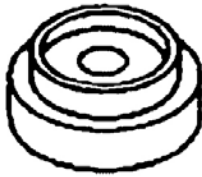
VW 792



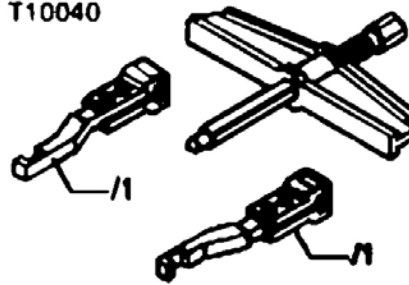
G00389984

Fig. 192: Identifying Differential Disassembly & Assembly Special Tools (2 Of 3)
Courtesy of VOLKSWAGEN UNITED STATES, INC.

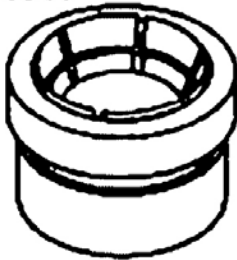
VW 433



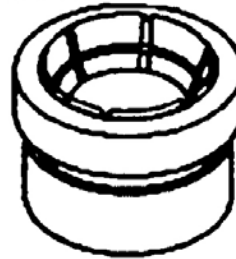
T10040



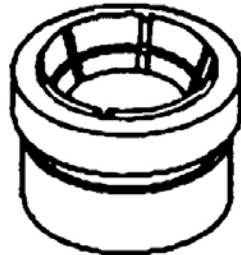
V.A.G 1582/6



V.A.G 1582/6A

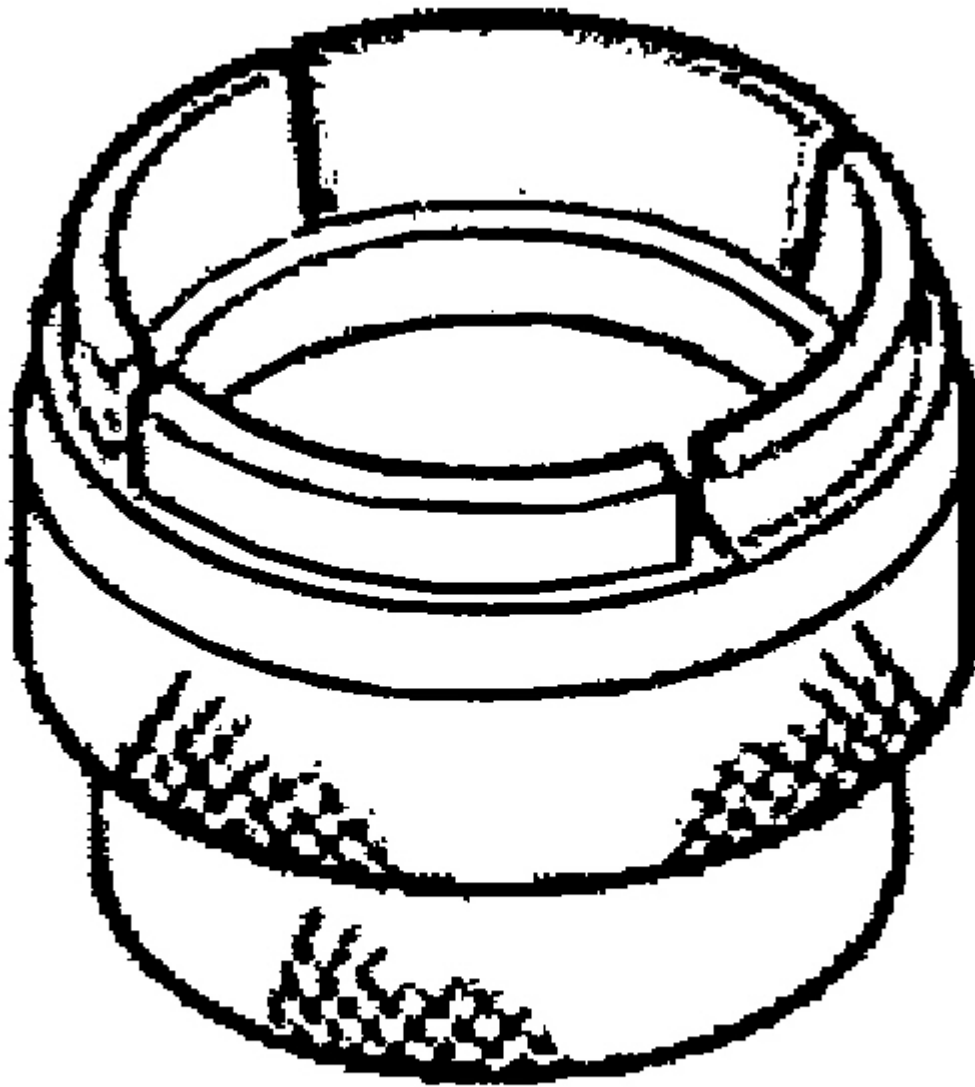


V.A.G 1582/11



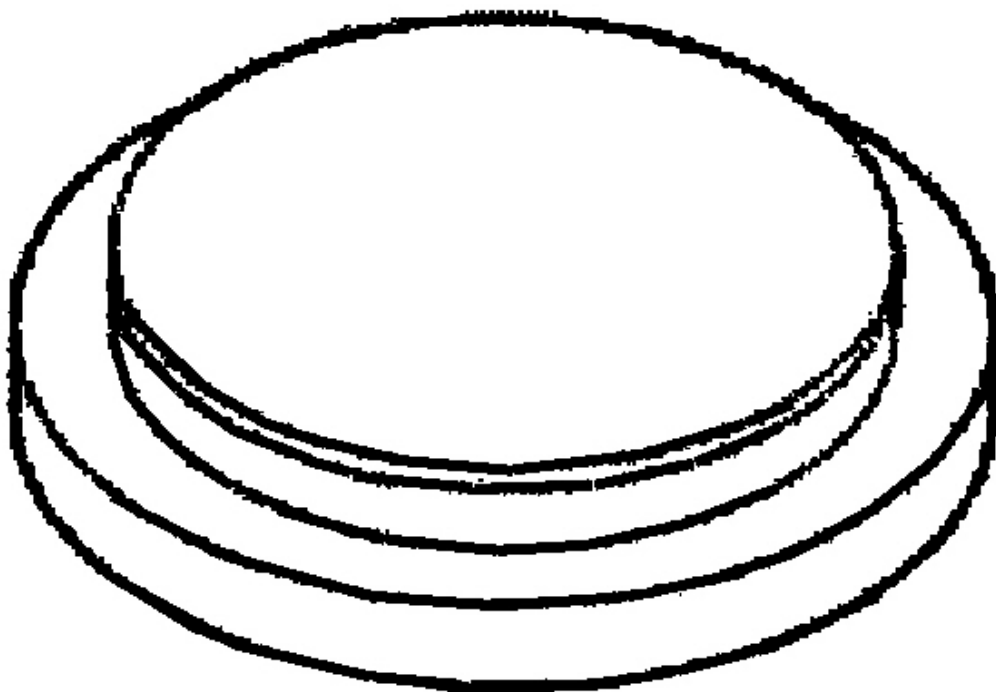
G00389985

Fig. 193: Identifying Differential Disassembly & Assembly Special Tools (3 Of 3)
Courtesy of VOLKSWAGEN UNITED STATES, INC.



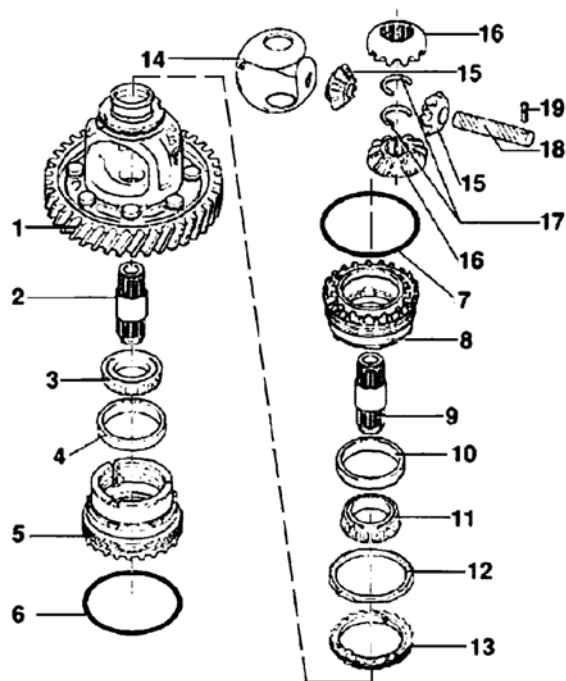
G00389986

Fig. 194: Identifying Clamping Ring (VAG 1582/3)
Courtesy of VOLKSWAGEN UNITED STATES, INC.



G00389987

Fig. 195: Identifying Thrust Piece (30-555)
Courtesy of VOLKSWAGEN UNITED STATES, INC.



Note: -Heat tapered roller bearing inner race to 100° C before pressing on.
 -Heat adjusting ring for tapered roller bearing to 100° C before pressing in tapered roller bearing outer race.

1. Differential Housing With Riveted Gear For Final Drive
 Final drive gear is riveted onto differential housing and then machined
 If differential or final drive gear is damaged, replace differential housing together with riveted final drive gear
 Differential housings differ depending on diameter of tapered roller bearings
2. Output Shaft/Drive Flange
3. Tapered Roller Bearing Inner Race
 There are different sizes of tapered roller bearings. The installation location can vary
4. Tapered Roller Bearing Outer Race
 Remove and install only when adjusting ring heated
 Drive out with drift

G00389988

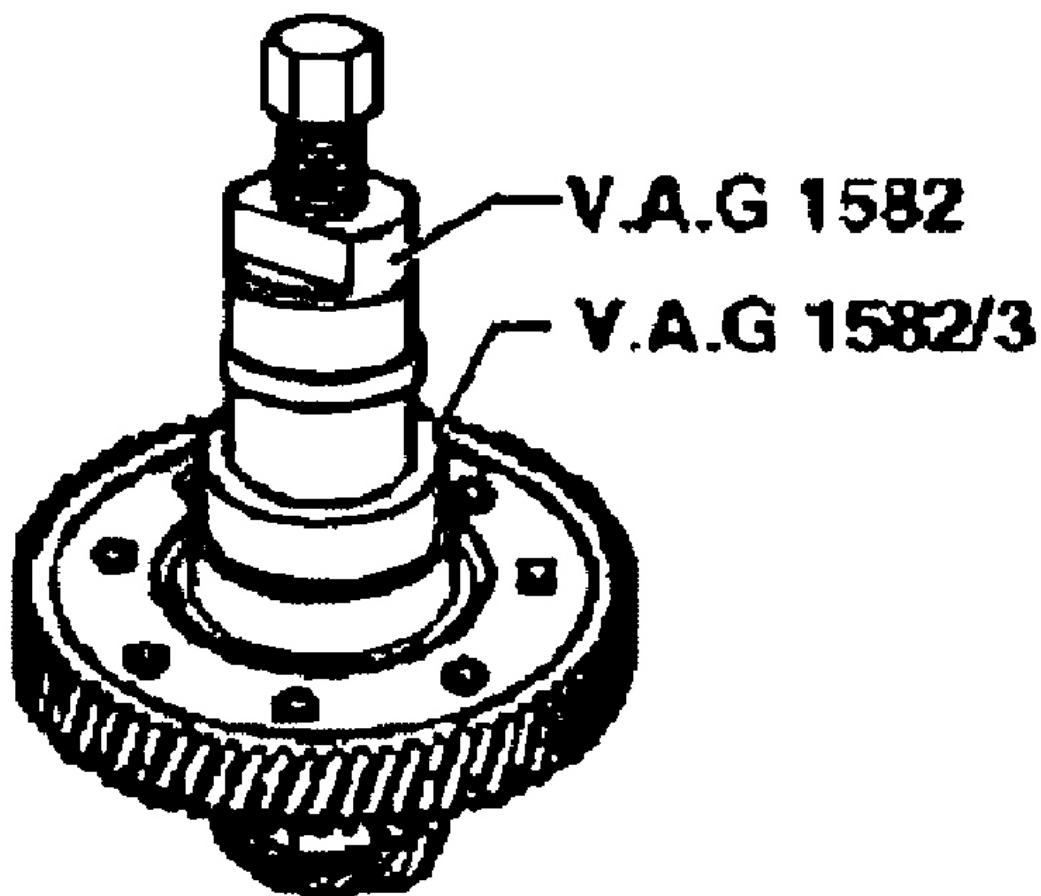
5. Bearing Body For Tapered Roller Bearing
 There are different types of bearing body
6. O-Ring (Always replace)
7. O-Ring (Always replace)
8. Adjusting Ring For Tapered Roller Bearing
9. Output Shaft/Drive Flange
10. Tapered Roller Bearing Outer Race
 Remove and install only when adjusting ring heated
 Drive out with drift
11. Tapered Roller Bearing Inner Race
 There are different sizes of tapered roller bearings.
 The installation location can vary
12. Driver Bushing
 Drive off together with speedometer drive gear -item 13 -
 Drive on with drift
13. Speedometer Drive Gear
 Drive out with a drift
 Install together with driver bushing -item 12 -
14. One-Piece Thrust Washer
 Place into differential cage before inserting bevel gears
15. Small Bevel Gears
16. Large Bevel Gears
17. Circlip
WARNING!
 Do not remove circlip until after pulling off drive flange as compression spring is pre-tensioned.
18. Shaft For Bevel Gears
 Drive out with a drift
 When driving in, do not damage one-piece thrust washer
19. Spring Pin
 For securing shaft for bevel gears

Fig. 196: Overview Of Differential Disassembly & Assembly
 Courtesy of VOLKSWAGEN UNITED STATES, INC.

Pulling Off Tapered Roller Bearing Inner Race

Use adapter VAG 1582/6A for larger bearings

Place press piece 30-555 on differential housing. See **Fig. 197** .

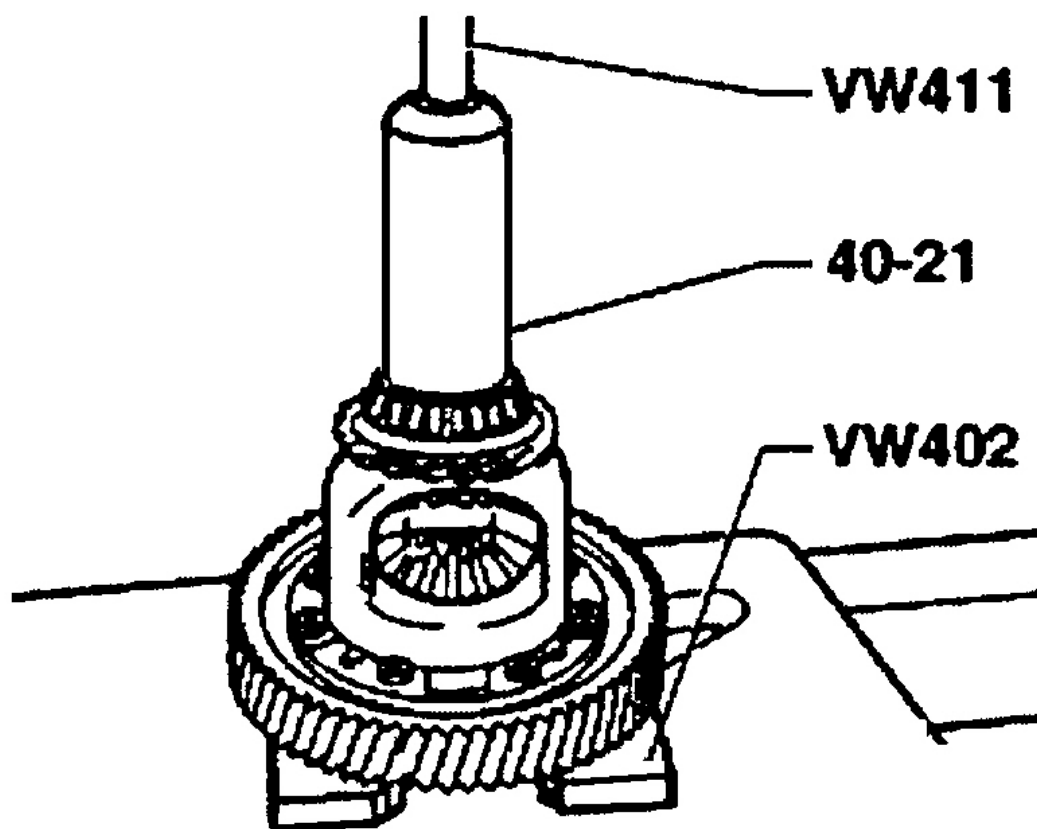


G00389989

Fig. 197: Pulling Off Tapered Roller Bearing Inner Race
Courtesy of VOLKSWAGEN UNITED STATES, INC.

NOTE: For transmissions produced from 04.98, the tool for removing the tapered roller bearings in the final drive and differential is VAG 1582/8.

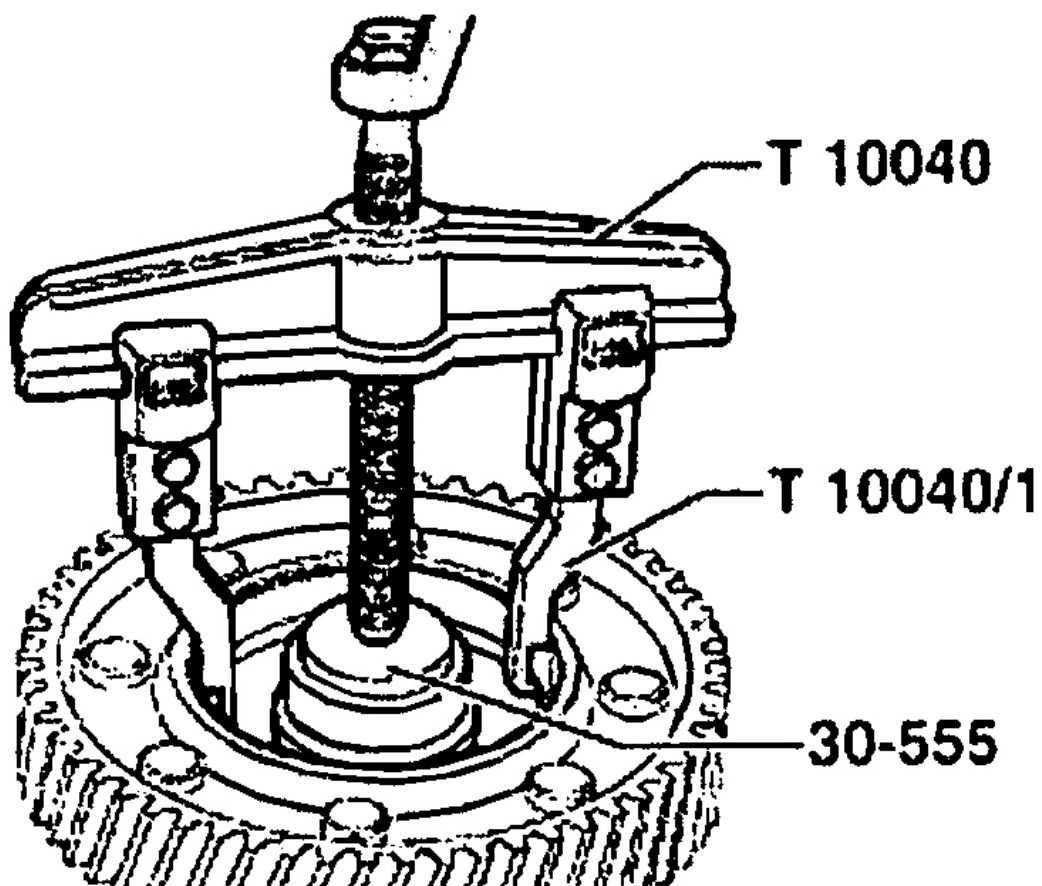
Pressing On Tapered Roller Bearing Inner Race



G00389990

Fig. 198: Pressing On Tapered Roller Bearing Inner Race
Courtesy of VOLKSWAGEN UNITED STATES, INC.

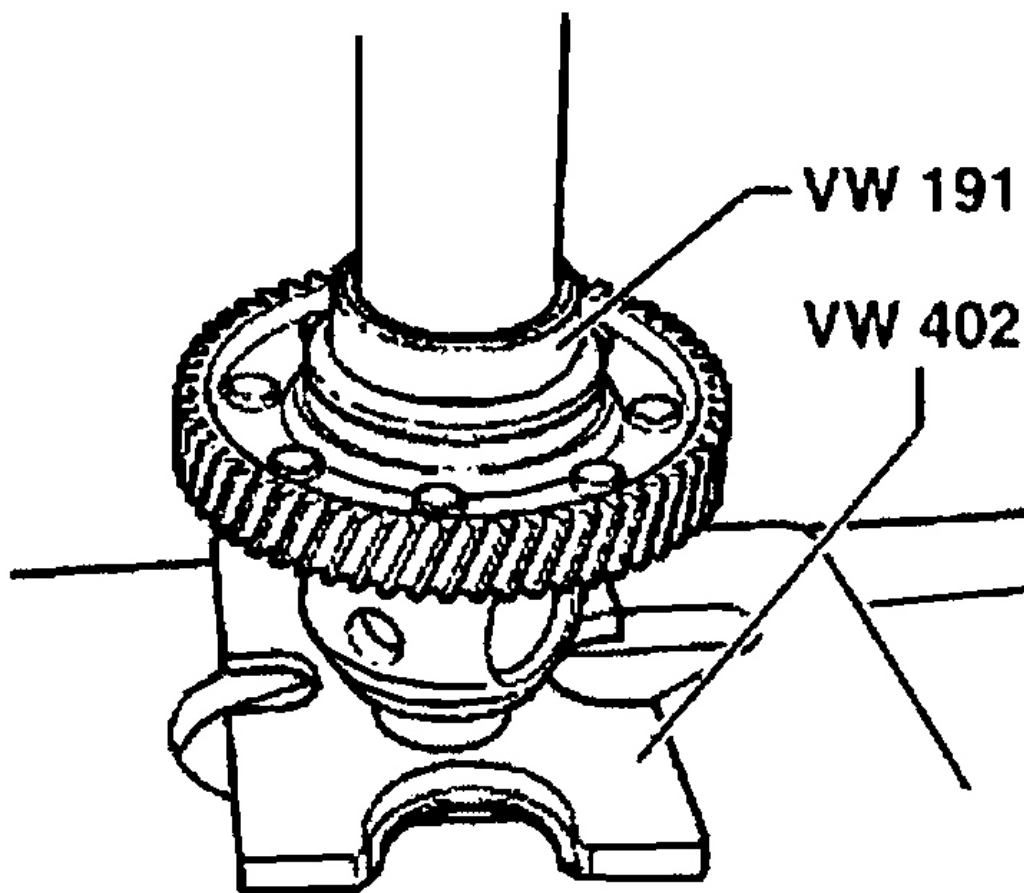
Pulling Out Tapered Roller Bearing Outer Race



G00389991

Fig. 199: Pulling Out Tapered Roller Bearing Outer Race
Courtesy of VOLKSWAGEN UNITED STATES, INC.

Pressing In Tapered Roller Bearing Outer Race



G00389992

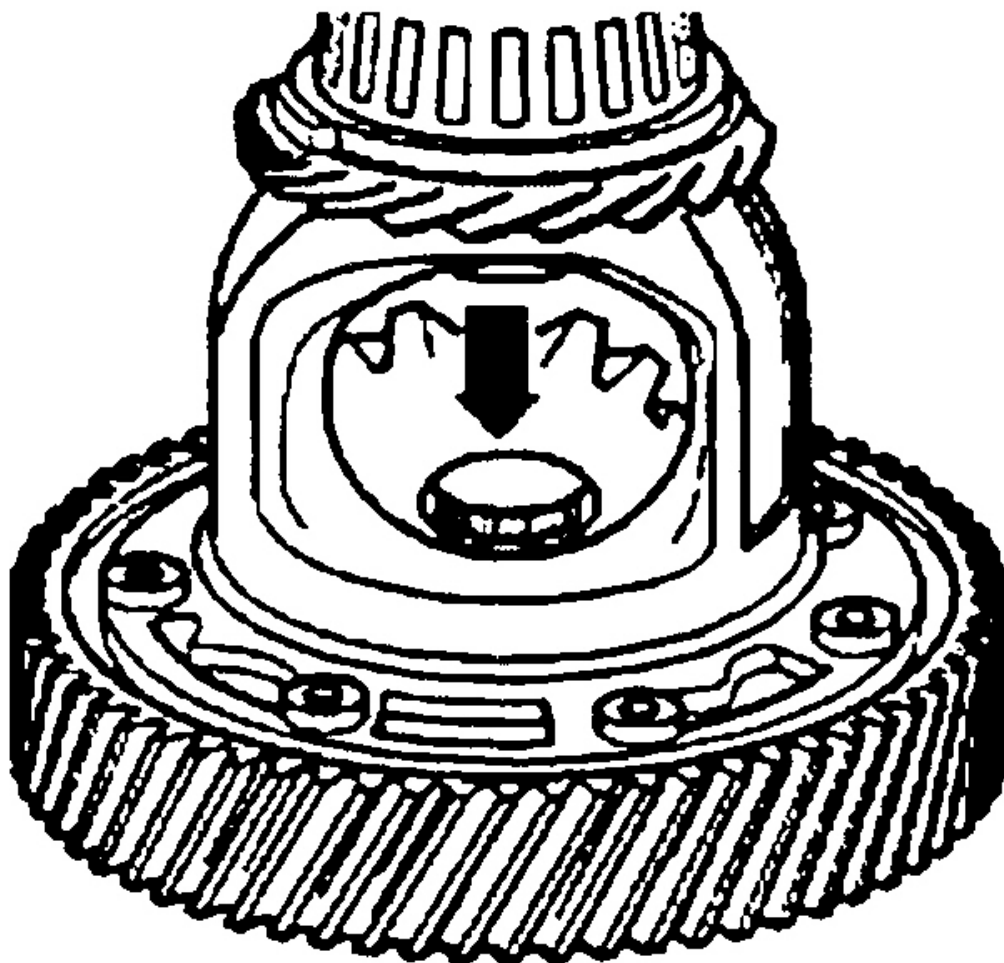
Fig. 200: Pressing In Tapered Roller Bearing Outer Race
Courtesy of VOLKSWAGEN UNITED STATES, INC.

Inserting Differential Bevel Gears

Insert one-piece thrust washer with gear oil.

Insert small bevel gears, drive in shaft and secure with spring pin.

Insert large bevel gears offset 180° and swivel in direction of arrow. See **Fig. 201** .

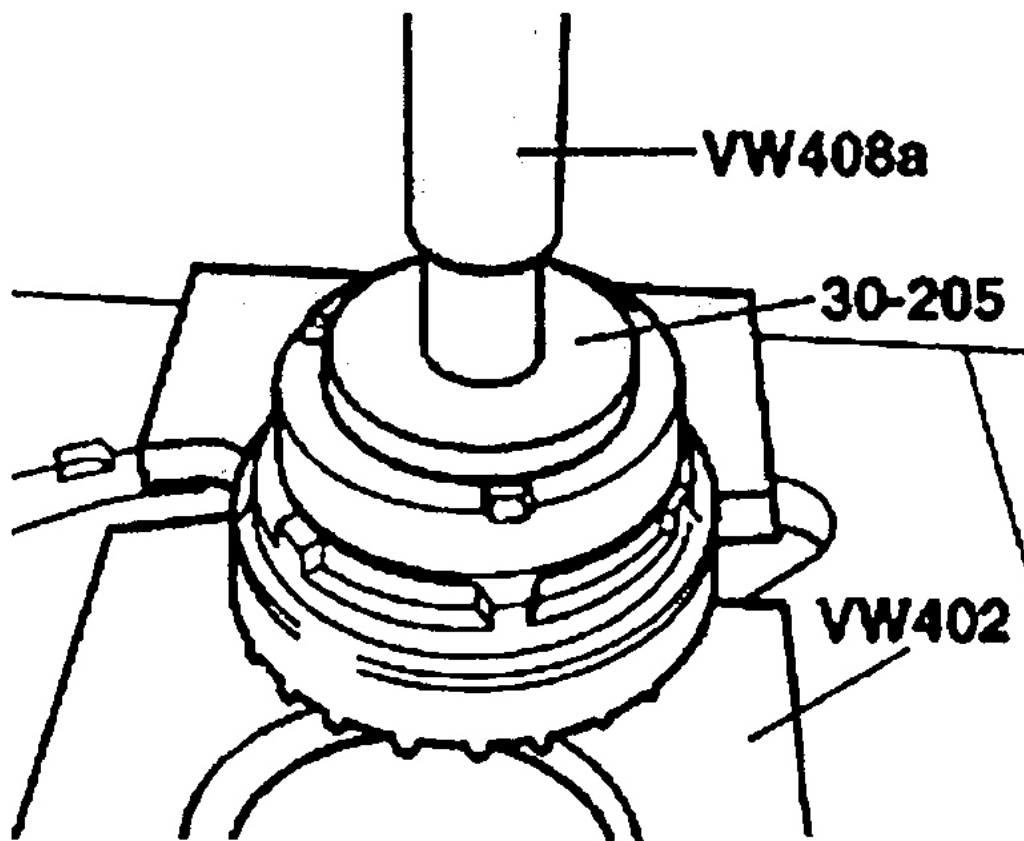


G00389993

Fig. 201: Inserting Differential Bevel Gears
Courtesy of VOLKSWAGEN UNITED STATES, INC.

Pressing In Tapered Roller Bearing Outer Race

With adjusting ring or bearing body heated, insert outer race and press home as far as stop. See **Fig. 202** .



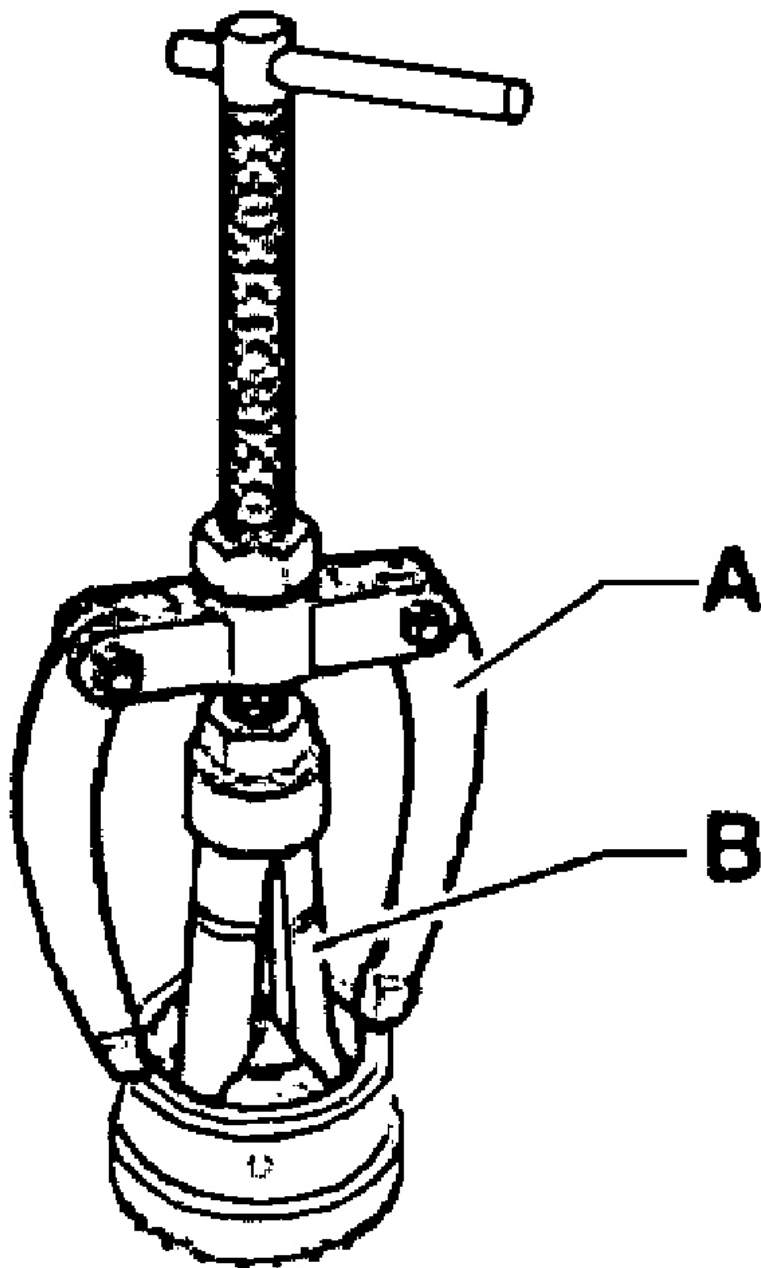
G00389994

Fig. 202: Pressing In Tapered Roller Bearing Outer Race
Courtesy of VOLKSWAGEN UNITED STATES, INC.

Pulling Out Tapered Roller Bearing Outer Race

A - Kukko 22/2 counter-support. See **Fig. 203** .

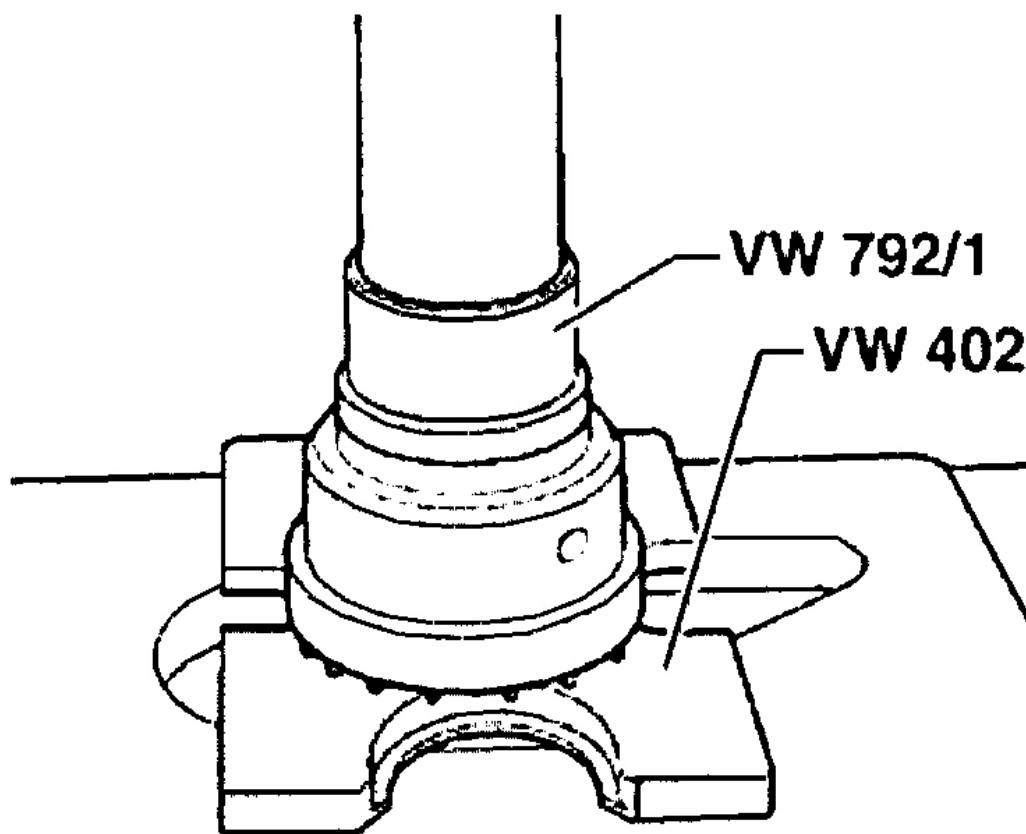
B - Kukko 21/7 internal puller



G00389995

Fig. 203: Pulling Out Tapered Roller Bearing Outer Race
Courtesy of VOLKSWAGEN UNITED STATES, INC.

Pressing In Tapered Roller Bearing Outer Race



G00389996

Fig. 204: Pressing In Tapered Roller Bearing Outer Race
Courtesy of VOLKSWAGEN UNITED STATES, INC.

Pulling Off Tapered Roller Bearing Inner Race

Place press piece VW 433 on bearing body.

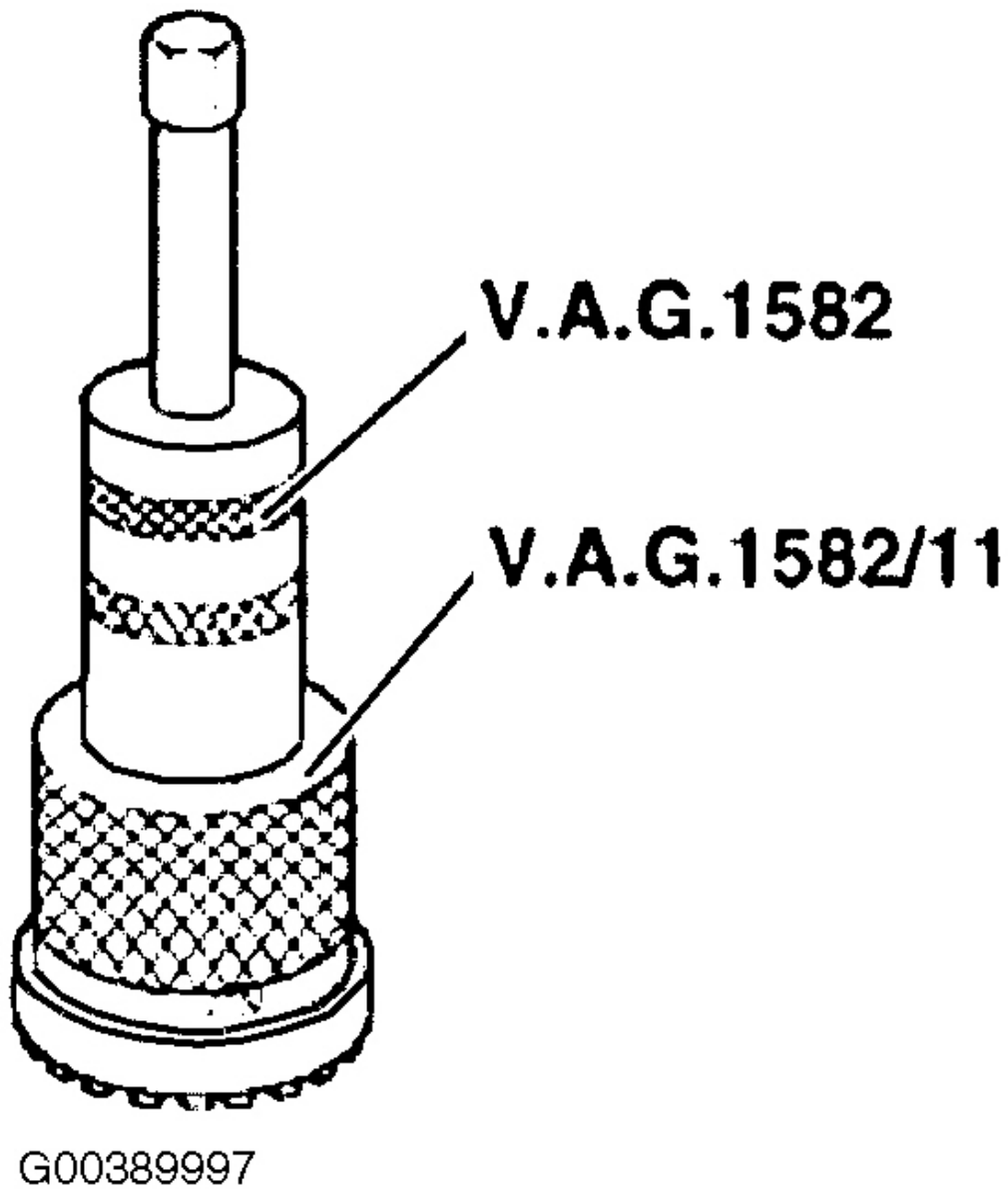
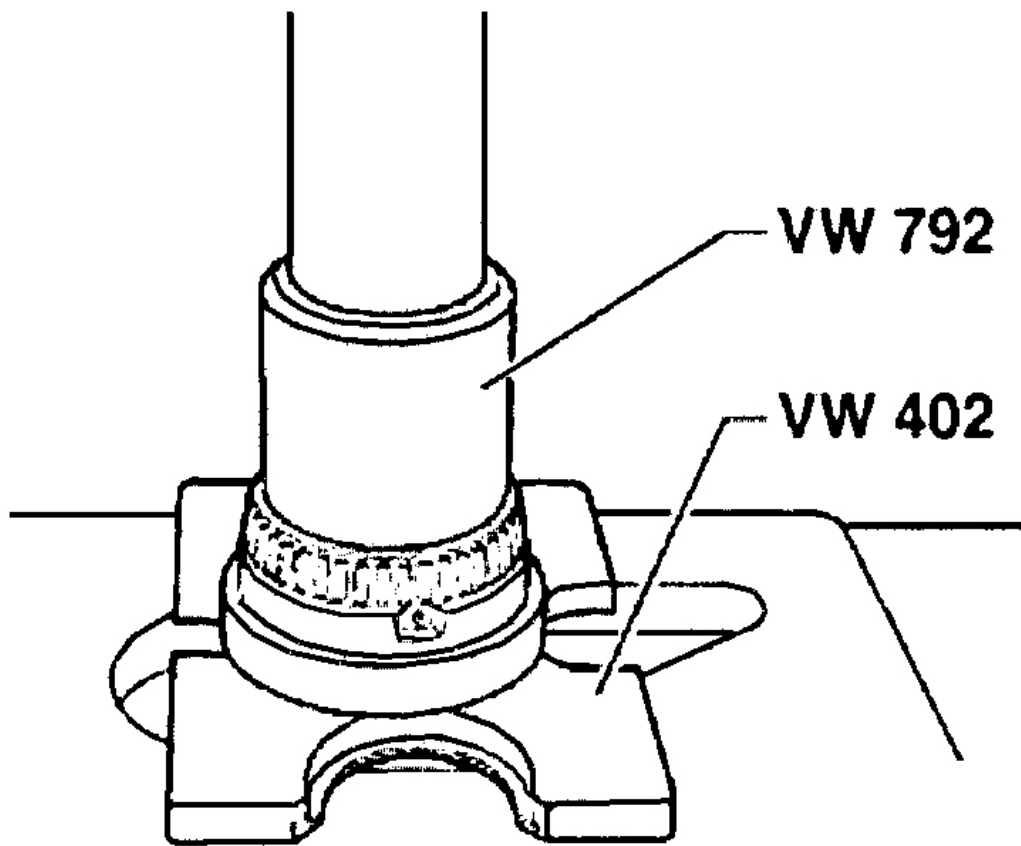


Fig. 205: Pulling Off Tapered Roller Bearing Inner Race
Courtesy of VOLKSWAGEN UNITED STATES, INC.

Pressing On Tapered Roller Bearing Inner Race



G00389998

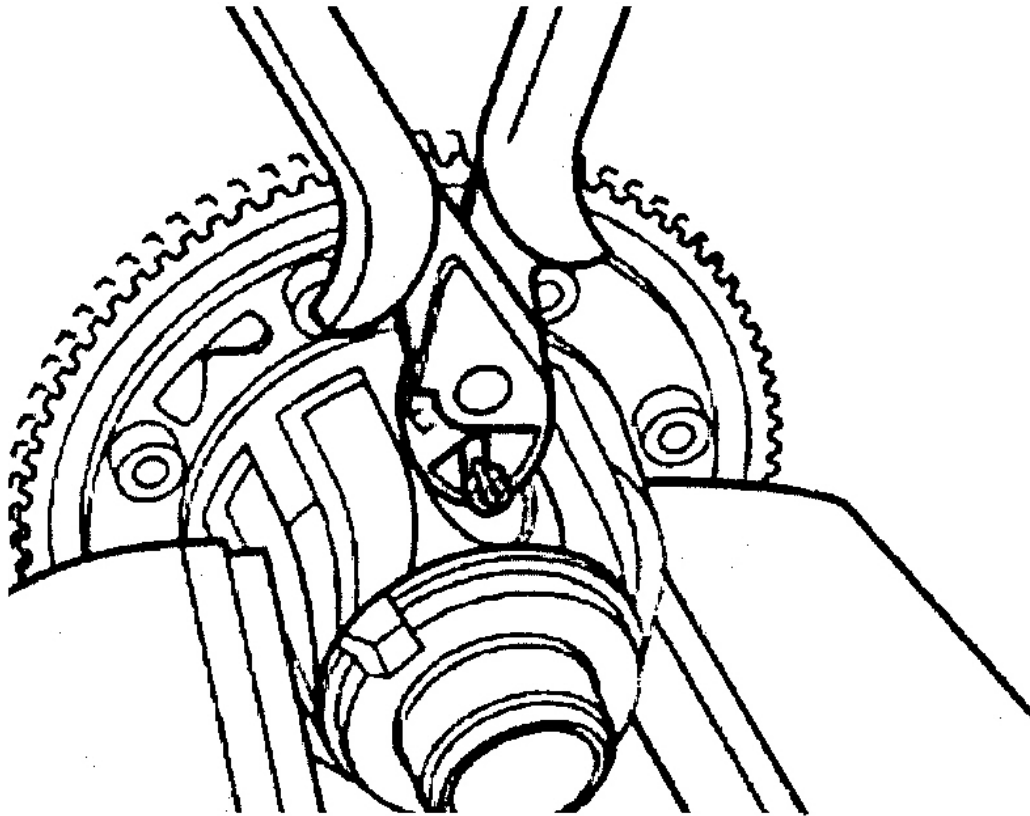
Fig. 206: Pressing On Tapered Roller Bearing Inner Race
Courtesy of VOLKSWAGEN UNITED STATES, INC.

Removing And Installing Differential Pinion Shaft Spring Pin

Length of spring pin 28.5 mm

Removing

Pull out spring pin with side cutting pliers. See **Fig. 207** .



G00389999

Fig. 207: Removing Differential Pinion Shaft Spring Pin
Courtesy of VOLKSWAGEN UNITED STATES, INC.

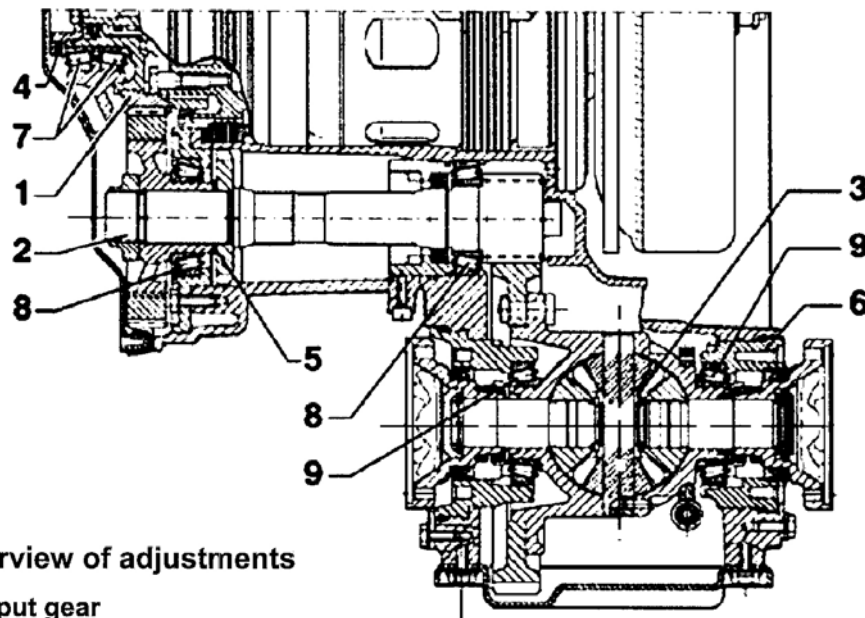
Installing

Drive in spring pin as far as stop.

FINAL DRIVE, ADJUSTING

OVERVIEW OF ADJUSTMENTS

To prevent unnecessary adjustment work on final drive after making repairs, see **ADJUSTMENTS TO BE COMPLETED AFTER REPLACING INDIVIDUAL COMPONENTS** .



Overview of adjustments

1 - Input gear

2 - Drive pinion

3 - Differential

4 - Shim for input gear

5 - Shim for drive pinion

6 - Shim for differential

7 - Tapered roller bearings for input gear

◆ Always replace together

◆ Re-determine shim when replacing tapered roller bearings

8 - Tapering roller bearings for drive pinion

◆ Always replace together

◆ Re-determine shim when replacing tapered roller bearings

9 - Tapered roller bearings for differential

◆ Always replace together

G00390000

Fig. 208: Overview Of Final Drive Adjustments

Courtesy of VOLKSWAGEN UNITED STATES, INC.

ADJUSTMENTS TO BE COMPLETED AFTER REPLACING INDIVIDUAL COMPONENTS

When working on transmission the following components only require adjustment if individual components have been replaced that directly affect the final drive adjustment. To eliminate unnecessary adjustments observe the following table:

Components being replaced:	To adjust:		
	Differential housing with riveted ring gear See DIFFERENTIAL ADJUSTING	Adjusting input gear ¹⁾ See INPUT GEAR, ADJUSTING	Adjusting drive pinion with output gear ¹⁾ See DRIVE PINION ADJUSTING.
Transmission housing	X	X	X
Input gear ¹⁾		X	X
Input gear tapered roller bearing		X	
Output gear ¹⁾		X	X
Drive pinion			X
Drive pinion tapered roller bearing			X
Differential cage with ring gear	X		
Tapered roller bearing for differential, bearing body or shim	X		
Supporting ring, park lock gear or bearing cover			X

¹⁾ Always replace input gear and output gear together

G00390001

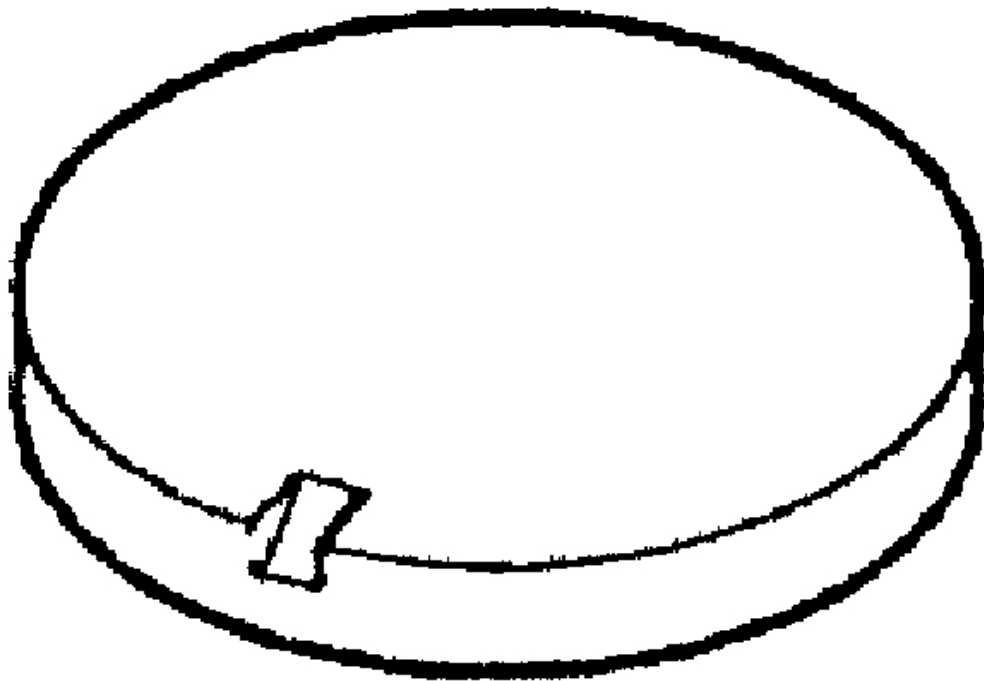
Fig. 209: Adjustments Table (After Replacing Individual Components)
Courtesy of VOLKSWAGEN UNITED STATES, INC.

DRIVE PINION, ADJUSTING

Special Tools And Equipment

- VW 385/17 End dimension plate
- VW 387 Universal dial gauge bracket
- Dial gauge

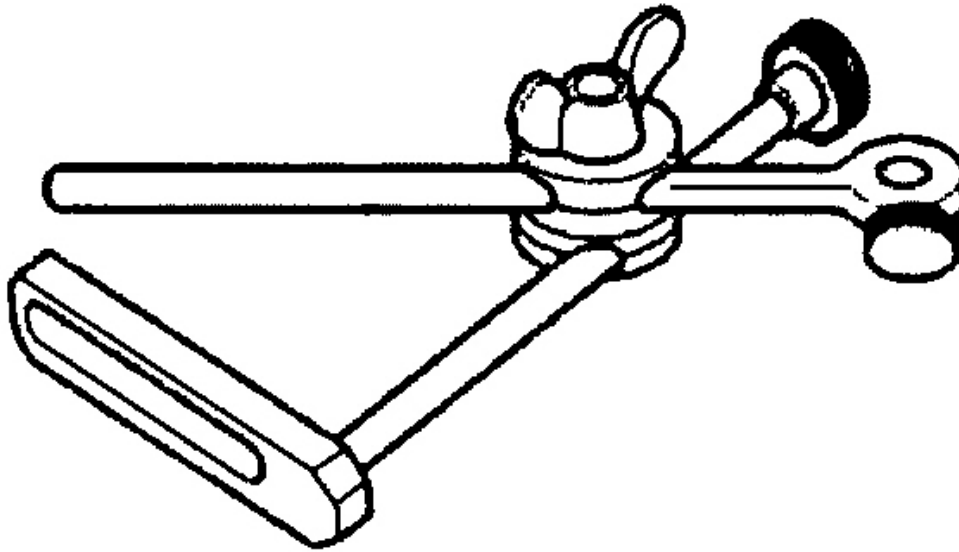
VW 385/17



G00390002

Fig. 210: Identifying End Dimension Plate (VW 385/17)
Courtesy of VOLKSWAGEN UNITED STATES, INC.

VW 387



G00390003

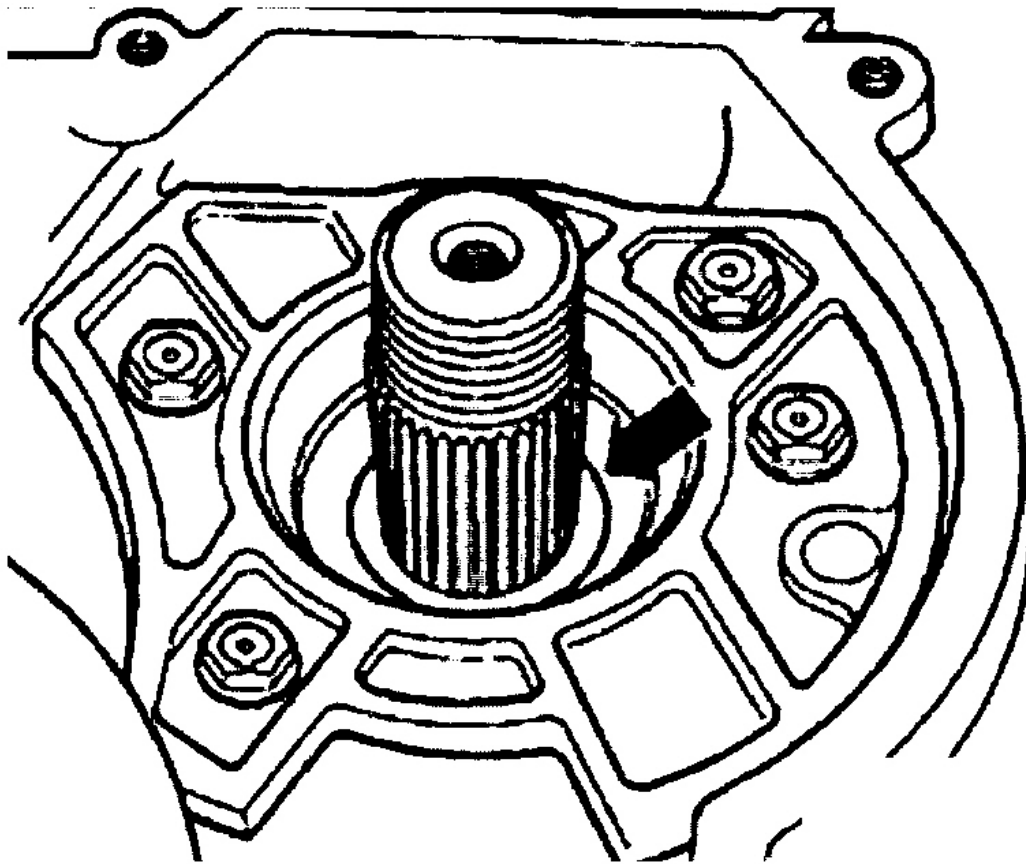
Fig. 211: Identifying Universal Dial gauge Bracket (VW 387)
Courtesy of VOLKSWAGEN UNITED STATES, INC.

Conditions

- Supporting ring for drive pinion bearing is installed and secured.
- Parking lock mechanism and parking lock gear are installed.

Adjusting

Place two shims (each 1.5 mm thick) -arrow- onto drive pinion. See **Fig. 212** .

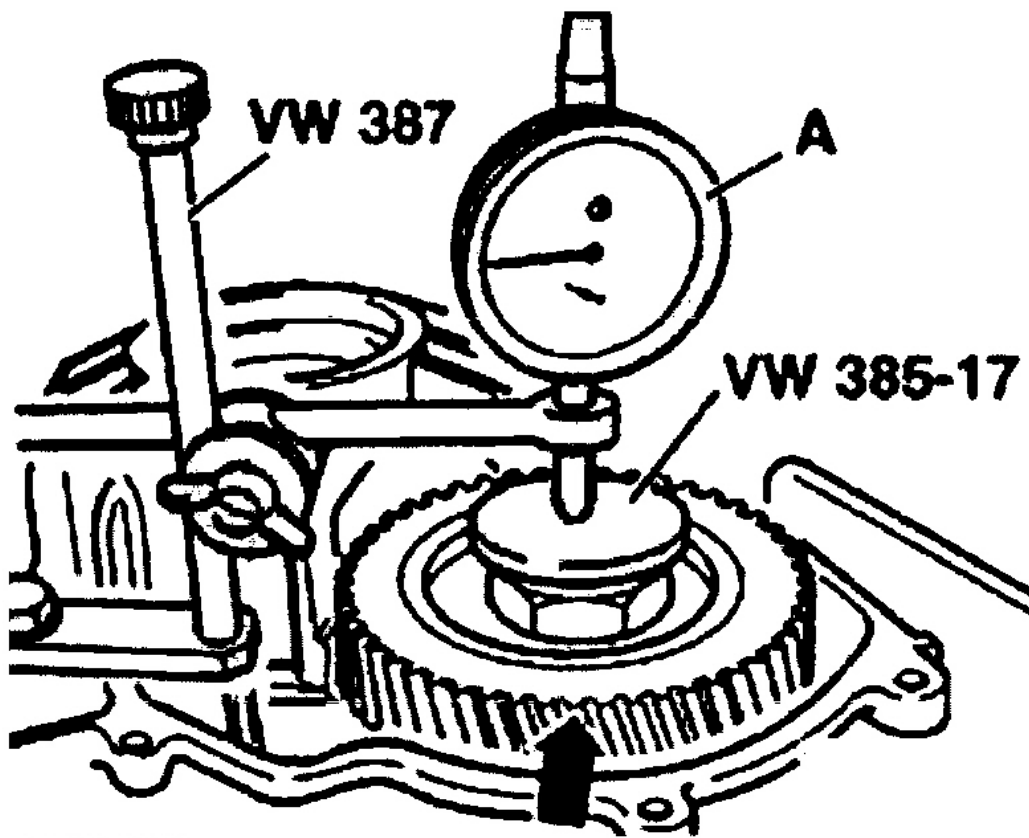


G00390004

Fig. 212: Locating Shims On Drive Pinion
Courtesy of VOLKSWAGEN UNITED STATES, INC.

Place output gear with tapered roller bearing onto drive pinion and tighten hex nut (41 mm AF) to 250 Nm; engage parking lock when performing this step.

Insert dial gauge -A- and zero with a preload of 1 mm. See **Fig. 213** . Move drive pinion up and down. Read off play at dial gauge and note (example 0.93 mm).



G00390005

Fig. 213: Identifying Dial Gauge Installation Position
Courtesy of VOLKSWAGEN UNITED STATES, INC.

NOTE: When performing measurement, do not turn drive pinion as the bearings will otherwise settle and give you a false measurement.

Determining Shims

The specified bearing preload is achieved if the reading (0.93 mm), the preload of the bearings 0.12 mm and the amount for compression 0.10 mm are deducted from the 2 x 1.5 mm thick shims.

Example calculation:

- "start" Shims inserted = 3.00 mm
- "minus" Reading = 0.93 mm
- "minus" Preload = 0.12 mm

- "minus" Amount for settlement = 0.10 mm
- "equals" Thickness of shim = 1.85 mm

Remove output gear. Determine size of shim on basis of table, and fit onto pinion. See **Table Of Shims For Drive Pinion And Input Gear** .

Re-install output gear and tighten hex nut to 250 Nm. Secure with drift.

Table Of Shims For Drive Pinion And Input Gear

Gauged thickness (mm)	Shim to be fitted (mm)	Gauged thickness (mm)	Shim to be fitted (mm)	Gauged thickness (mm)	Shim to be fitted (mm)
0.975 ... 0.999	1.000	1.550 ... 1.574	1.575	2.125 ... 2.149	2.150
1.000 ... 1.024	1.025	1.575 ... 1.599	1.600	2.150 ... 1.274	2.175
1.025 ... 1.049	1.050	1.600 ... 1.624	1.625	2.175 ... 2.199	2.200
1.050 ... 1.074	1.075	1.625 ... 1.649	1.650	2.200 ... 2.224	2.225
1.075 ... 1.099	1.100	1.650 ... 1.674	1.675	2.225 ... 2.249	2.250
1.100 ... 1.124	1.125	1.675 ... 1.699	1.700	2.250 ... 2.274	2.275
1.125 ... 1.149	1.150	1.700 ... 1.724	1.725	2.275 ... 2.299	2.300
1.150 ... 1.174	1.175	1.725 ... 1.749	1.750	2.230 ... 2.324	2.325
1.175 ... 1.199	1.200	1.750 ... 1.774	1.775	2.325 ... 2.349	2.350
1.200 ... 1.224	1.225	1.775 ... 1.799	1.800	2.350 ... 2.374	2.375
1.225 ... 1.249	1.250	1.800 ... 1.824	1.825	2.375 ... 2.399	2.400
1.250 ... 1.274	1.275	1.825 ... 1.849	1.850	2.400 ... 2.424	2.425
1.275 ... 1.299	1.300	1.850 ... 1.874	1.875	2.425 ... 2.449	2.450
1.300 ... 1.324	1.325	1.875 ... 1.899	1.900	2.450 ... 2.474	2.475
1.325 ... 1.349	1.350	1.900 ... 1.924	1.925	2.475 ... 2.499	2.500
1.350 ... 1.374	1.375	1.925 ... 1.949	1.950	2.500 ... 2.524	2.525
1.375 ... 1.399	1.400	1.950 ... 1.974	1.975	2.525 ... 2.549	2.550
1.400 ... 1.424	1.425	1.975 ... 1.999	2.000	2.550 ... 2.574	2.575
1.425 ... 1.449	1.450	2.000 ... 2.024	2.025	2.575 ... 2.599	2.600
1.450 ... 1.474	1.475	2.025 ... 2.049	2.050	2.600 ... 2.624	2.625
1.475 ... 1.499	1.500	2.050 ... 2.074	2.075	2.625 ... 2.649	2.650
1.500 ... 1.524	1.525	2.075 ... 2.099	2.100	2.650 ... 2.674	2.675
1.525 ... 1.549	1.550	2.100 ... 2.124	2.125	2.675 ... 2.700	2.700

- Different tolerances enable the required shim thickness to be measured precisely.

G00390006

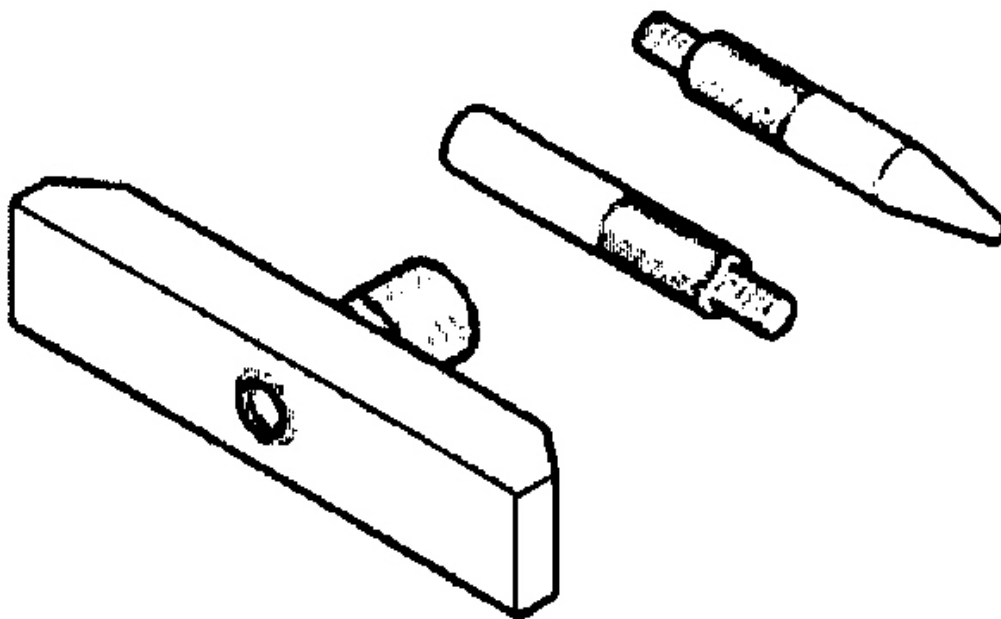
Fig. 214: Drive Pinion & Input Gear Shim Table
Courtesy of VOLKSWAGEN UNITED STATES, INC.

INPUT GEAR, ADJUSTING

Special Tools And Equipment

- VW 382 Measuring appliance
- VAG 1332 Torque wrench
- Dial gauge

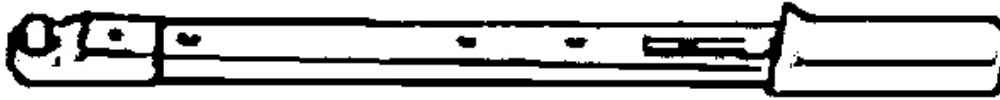
VW 382



G00390007

Fig. 215: Identifying Measuring Appliance (VW 382)
Courtesy of VOLKSWAGEN UNITED STATES, INC.

V.A.G 1332

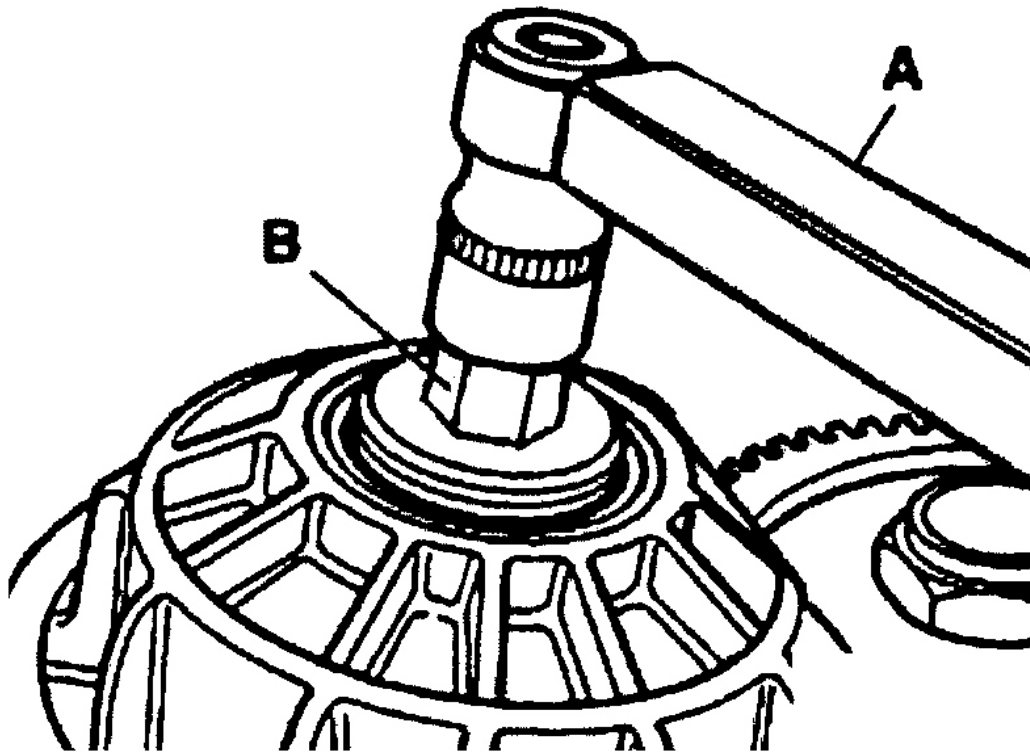


G00390008

Fig. 216: Identifying Torque Wrench (VAG 1332)
Courtesy of VOLKSWAGEN UNITED STATES, INC.

Conditions

Tighten socket head fastener to 100 Nm without dished washer and without shim. See **Fig. 217** . The parking lock must be engaged. Remove socket head fastener.



G00390009

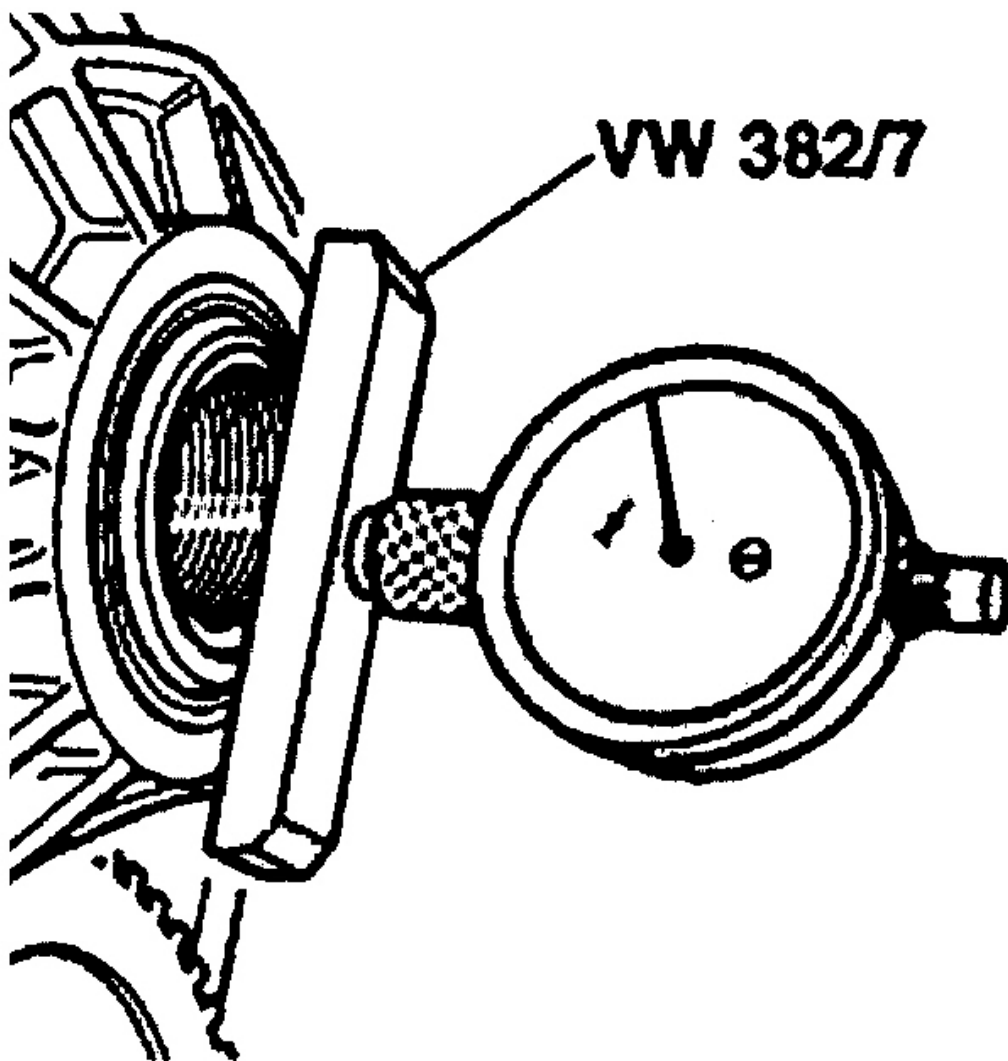
Fig. 217: Tightening Socket Head Fastener Without Dished Washer Or Shim
Courtesy of VOLKSWAGEN UNITED STATES, INC.

For **Fig. 217** , components are:

- A - Torque wrench
- B - 22 mm socket

Measure distance between input gear and tapered roller bearing inner race. See **Fig. 218** .

Insert dial gauge and zero with a preload of 3 mm. See **Fig. 218** . Note reading (example 1.00 mm).



G00390010

Fig. 218: Inserting Dial Gauge For Input Gear
Courtesy of VOLKSWAGEN UNITED STATES, INC.

Thickness of dished washer, 1.50 mm, must be added to reading to equal 2.50 mm.

Determining Shim (Input Gear)

The specified bearing preload is achieved if the bearing preload of 0.18 mm is deducted from the figure

obtained from the measurement (dished washer + reading) of 2.50 mm.

Example calculation:

- "start" Dished washer + reading = 2.50 mm
- "minus" Bearing preload = 0.18 mm
- "equals" Thickness of shim = 2.32 mm

Determine shim on basis of table and fit onto drive shaft. See **Table Of Shims For Drive Pinion And Input Gear** .

Insert axial needle bearing and tighten socket head fastener including dished washer to 250 Nm.

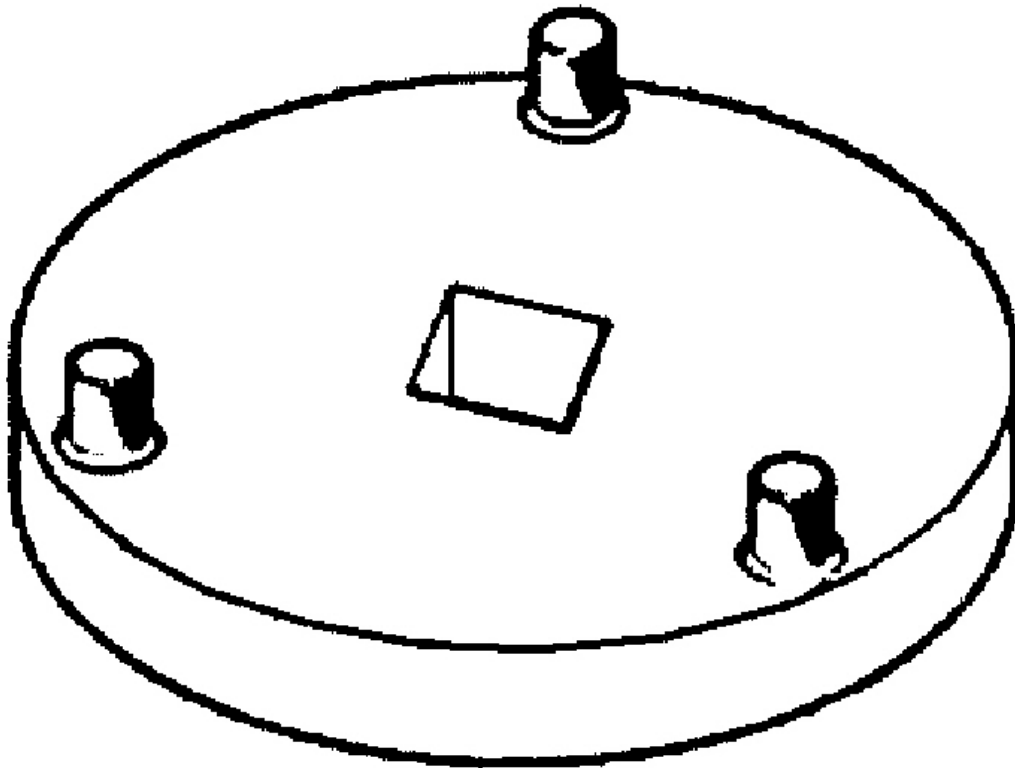
NOTE: **Insert axial needle bearing for input shaft before tightening socket head fastener. Installation position. See INPUT GEAR, REMOVING AND INSTALLING .**

DIFFERENTIAL, ADJUSTING

Special Tools And Equipment

- 3155 Ring nut spanner
- VAG 1332 Torque Wrench

3155

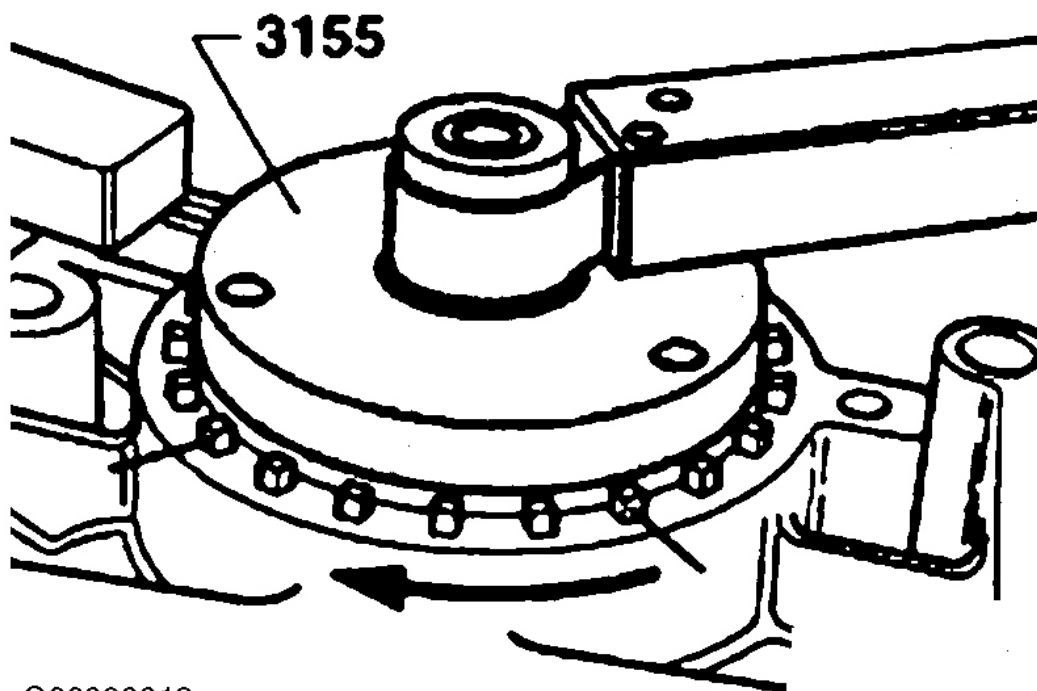


G00390011

Fig. 219: Identifying Ring Nut Spanner (3155)
Courtesy of VOLKSWAGEN UNITED STATES, INC.

Adjusting Differential

Tighten bearing body with 3155 to 150 Nm as far as stop and secure. See **Fig. 220** .



G00390012

Fig. 220: Tightening Bearing Body with Special Tool 3155
Courtesy of VOLKSWAGEN UNITED STATES, INC.

Tighten adjusting ring to 50 Nm and mark.

NOTE: When performing measurement, do not turn differential otherwise the bearings will settle and give you a false measurement.

Turn adjusting ring on by five locking lugs and secure so that preload of tapered roller bearings is set.

DEFINITIONS

These definitions are only for this assembly group: Automatic transmission 01M. They are not valid for general use.

ATF (AUTOMATIC TRANSMISSION FLUID)

Transmission oil for automatic transmission.

ATF PUMP

A gear type pump driven by the torque converter.

ATF LEVEL

The fill level of ATF in the transmission with engine running.

DATA BUS

Transportation of data. To do this the electrical signals are brought into a certain format (bus).

DATA BUS LOW (HIGH)

The voltage used to transport the data is low (high).

BRAKES

These hold rotating components in the transmission. The automatic transmission is fitted with plate type brakes. In difference to the clutches, the brakes support against the transmission housing.

TORQUE CONVERTER

Transfers the engine torque to the automatic transmission and acts as a drive-away clutch. The torque converter also includes the lock-up clutch.

ON BOARD DIAGNOSTIC (OBD)

The capability of the control module:

- to recognize malfunctions,
- to react to malfunctions,
- to store diagnostic trouble codes (DTCs),
- to register malfunctions and make them available in the Measured Value Block.

PERFORMING ON BOARD DIAGNOSTIC

Connecting the Scan Tool to be able to check the Diagnostic Trouble Code (DTC) memory.

PERFORMING ELECTRICAL CHECK

A targeted check of the electronic components by performing certain measurements.

FREEWHEEL/STATOR

Ensures the torque is increased in the torque converter when driving off.

FREEWHEEL/TRANSMISSION

Technically simplifies the gear changes without interrupting the power and ensures a constant gear change quality.

TRANSMISSION VEHICLE SPEED SENSOR (VSS) -G38-

The sensor records the speed of the large sun-wheel in the planetary gearbox and transmits it to the automatic transmission control module. Further information on this can be found in Self-study program No. 172.

VEHICLE SPEED SENSOR (VSS) -G68-

The sensor records the speed of the output gear and transmits it to the automatic transmission control unit (not to the speedometer). Further information on this can be found in Self-study program No. 172.

CLUTCHES

Together with the brakes, they engage the individual gears.

SELECTOR LEVER LOCK SOLENOID N110

Located in the selector mechanism close to the selector lever. Prevents movement (involuntary) of the selector lever from positions "P" and "N" as long as the brake pedal is not depressed.

SOLENOID VALVES

Opens and closes the oil channels to the clutches and brakes.

MULTI FUNCTION SWITCH -F125-

Electrical switch with multiple functions. For more information refer to Self-study program No. 172.

EMERGENCY RUNNING

"Condition of the control unit" when certain malfunctions are recognized it guarantees the further driving safety, protects the transmission against damage and at the same time impairs the driving characteristics only as much as is necessary.

PARKING LOCK

The parking lock gear is mechanically locked when the vehicle is stationary and prevents the vehicle from rolling (involuntarily).

PLANETARY GEARBOX

Is a mechanical component of the automatic transmission and is switched via the clutches and brakes without

loss of power.

PENDULUM SUPPORT

Designation for a part of the assembly mounting.

VALVE BODY

Located on the bottom of the transmission and is enclosed in the ATF pan. Its valves regulates the hydraulic pressure and distributes it via the oil channels to the switch elements (clutches and brakes).

TRANSMISSION CONTROL MODULE (TCM) -J217-

The electronic control module defines the shift points. The function of the transmission is monitored via the self-diagnosis. If a component or sensor fails, an emergency running program ensures the vehicle can still be driven.

TCC (TORQUE CONVERTER LOCK-UP CLUTCH)

It transfers the engine torque mechanically to the transmission.

IGNITION KEY WITHDRAWAL LOCK

Makes sure that the ignition key can only be withdrawn when Park position is selected and also mechanically locks the selector level in this position.

2003-04 AUTOMATIC TRANSMISSION

Overhaul - New Beetle, 02E

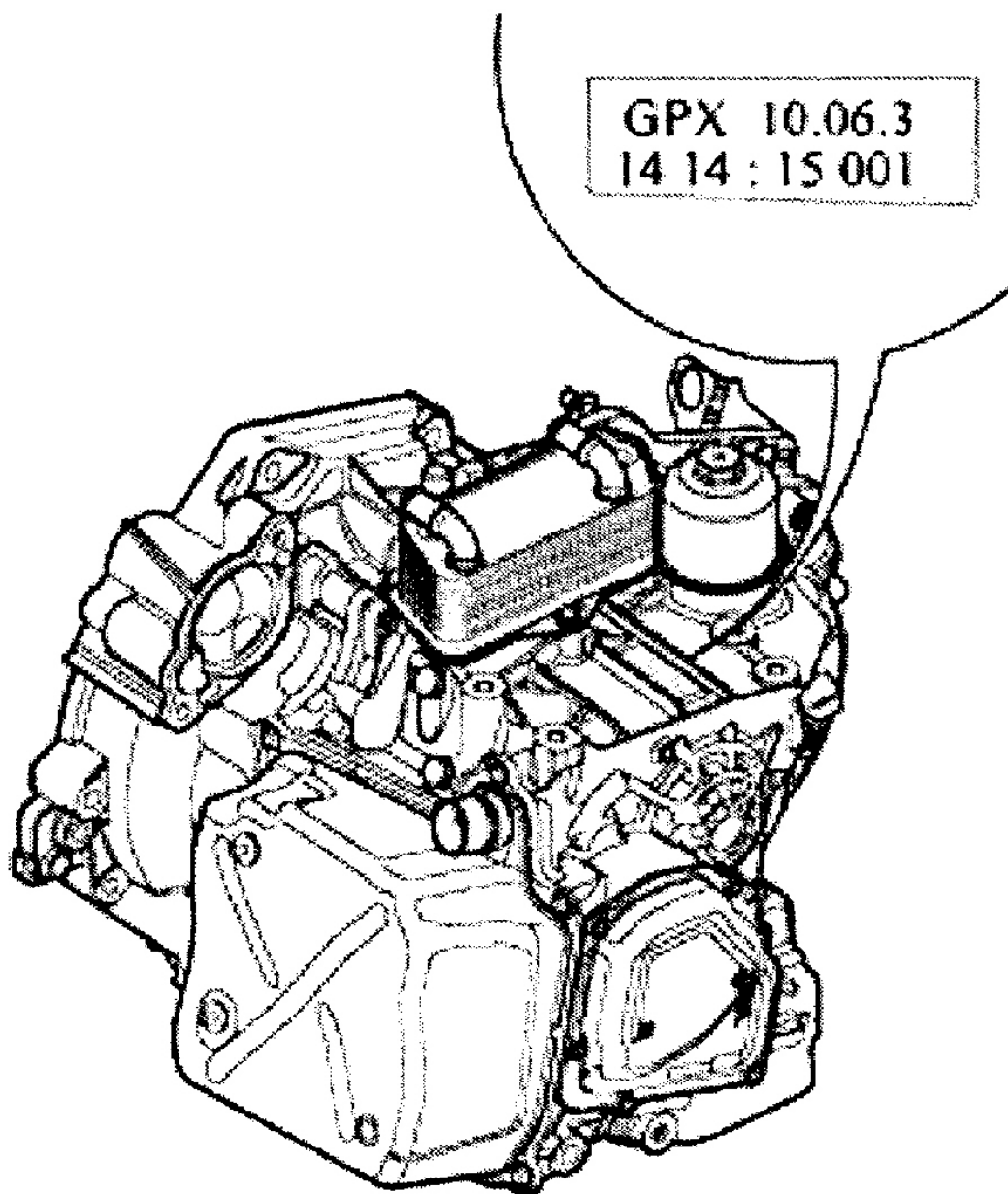
APPLICATION

TRANSMISSION APPLICATION

Application	Transmission Model
1.9L (2003-2004)	02E, 6-Speed

IDENTIFICATION

Transmission code letters are given on bottom of transmission, near oil cooler. See **Fig. 1** . Transmission code letters are also given on vehicle data stickers.



G00385831

Fig. 1: Locating Transmission Identification Code
Courtesy of VOLKSWAGEN UNITED STATES, INC.

CODE LETTERS, TRANSMISSION APPLICATION, RATIOS, EQUIPMENT

Automatic transmission		6-speed 02E
Identification code		GPX
Manufactured	from	08.03
	to	
Assignment	Model	New Beetle 1999 ➤
	Engine	1.9 l - 74 kW Turbo-diesel
Transmission ratios: $Z_2 : Z_1$	Final drive I for 1st to 4th speed	$70 : 16 = 4.375$
	Final drive II for 5th/6th and reverse gear	$70 : 21 = 3.333$
	st. gear	$45 : 13 = 3.462$
	2nd gear	$41 : 20 = 2.050$
	3rd gear	$39 : 30 = 1.300$
	4th gear	$37 : 41 = 0.902$
	5th gear	$32 : 35 = 0.914$
	6th gear	$31 : 41 = 0.756$
	Reverse	$33 : 13 \times 22 : 14 = 3.989$

G00390023

Fig. 2: Transmission Code GPX
Courtesy of VOLKSWAGEN UNITED STATES, INC.

DESCRIPTION & OPERATION

TRANSMISSION

The 6 Spd. Direct Shift Automatic Transmission 02E is also called double-clutch transmission. The engine torque is initiated via the two-mass flywheel into the transmission. The transmission is built up like a 6-speed manual transmission. By alternating sequence of the hydraulic activation of two multi-plate wet clutches, it is operated like an automatic transmission, that means the speeds are selected automatically or manually via Tiptronic mode. A clutch pedal is not installed.

SAFETY FUNCTIONS OF TRANSMISSION CONTROL MODULE

If one or more components or sensors fail the Transmission Control Module (TCM) -J217- activates the corresponding functions or emergency programs. This ensures a transmission operation without damage which

could have effects on gearshift function and quality.

GEAR CHANGE POINT VARIATIONS FOR HILLS

An additional gear change map automatically selects gear changes for hills dependent upon accelerator pedal position and driving speed.

- Gear change map for extreme uphill stretches, is matched to engine output.
- Gear change map for extreme downhill stretches, is matched to braking effect of the engine.
- By selecting a gear directly via Tiptronic the engine braking effect can be exploited also with a specific gear selected, such as when you have gradients in the trailer mode.

LUBRICATION & ADJUSTMENTS

For lubrication and adjustments, see **SERVICING - A/T (02E)** article in TRANSMISSION SERVICING.

ON-VEHICLE SERVICE

AXLE SHAFTS

For information on axle shaft, see **AXLE SHAFTS** article in DRIVELINE/AXLES.

TRANSMISSION COMPONENTS

For information on components serviceable while transmission is installed in vehicle, see **SERVICING - A/T (02E)** article.

APPLY & BRAKE CLUTCH APPLICATION

Manufacturer does not provide specific information for apply and brake clutch application.

REPAIR INSTRUCTIONS

The maximum possible care and cleanliness and proper tools are essential to ensure satisfactory and successful transmission repairs. The usual basic safety precautions naturally also apply when performing servicing work.

A number of generally valid instructions for various repair procedures, which are mentioned at various points in the Repair Manual; are summarized here.

BATTERY DISCONNECTING & RECONNECTING

CAUTION: Before beginning repairs on the electrical system:

- Obtain anti-theft radio security code.

- **Switch off all electrical consumers.**
- **Switch ignition off and remove ignition key.**
- **Do not loosen or remove ground strap from body. Disconnect terminal from battery only.**

For work steps required after reconnecting battery, see **Fig. 3** .

Work steps	completed?
Diagnostic Trouble Code (DTC) Memory: Check using VAS 5051 Tester in mode "Guided Fault Finding".	
Power windows (where applicable): Completely open and close all power windows.	
Radio: Input anti-theft radio code and check radio, CD & tape player functions as applicable.	
Clock: Check and reset to local time.	
All electrical consumers: Check function.	

G00387816

Fig. 3: Reconnecting Battery Work Steps
 Courtesy of VOLKSWAGEN UNITED STATES, INC.

NOTE: If desired, print this page and use the table above as a checklist.

RULES FOR CLEANLINESS WHEN WORKING ON TRANSMISSION

- Do not run engine or tow vehicle with oil pan removed or without gear oil.
- Carefully clean all joints and adjacent areas before disconnecting.
- When installing transmission make sure that the dowel sleeves between engine and transmission are seated correctly.
- Place parts that have been removed on a clean surface and cover so that they are not soiled. Use sheeting and paper. Do not use fluffy cloths!
- Only install clean components: Unpack replacement parts immediately prior to installation.
- Carefully cover opened components or seal if repairs cannot be carried out immediately.

O-RINGS, OIL SEALS, GASKETS

- Always replace O-rings, oil seals and gaskets.
- After removing seals/gaskets, examine the contact surfaces on housings or shafts for burrs and signs of damage and repair before reinstalling.
- Before installing a radial shaft seal lubricate the outside diameter with gear oil and fill the space between the sealing lips (arrow) halfway with G 052 128 A1.
- The open side of an oil seal faces towards the oil.
- Always use transmission oil. Other lubricants will cause the hydraulics to malfunction.
- Check gear oil level after installing and if necessary top off. See **SERVICING - A/T (02E)** article.

NUTS, BOLTS

- Loosen and tighten nuts, bolts/screws for securing covers and housings in a diagonal sequence.
- Do not tilt the very sensitive parts and also loosen and tighten in a diagonal sequence.
- The torque settings indicated refer to non-lubricated screws and bolts:
- Threads of bolts/screws that are secured by locking fluid are to be cleaned with a wire brush. Then insert bolts/screws with AMV 185 100 A1.
- All threaded holes where locking fluid is applied must be cleaned with a thread tap to remove remnants of locking fluid. Otherwise there is a danger that a bolt/screw will shear when reinstalling.
- Replace self-locking nuts.

OVERHAUL

Manufacturer does not provide overhaul procedures or specifications. For fluid capacities and types, adjustment or servicing procedures, see **SERVICING - A/T (02E)** article. For removal and installation procedures, see **REMOVAL & INSTALLATION - A/T (02E)** article.

2002-04 AUTOMATIC TRANSMISSION

Overhaul - New Beetle, 09G

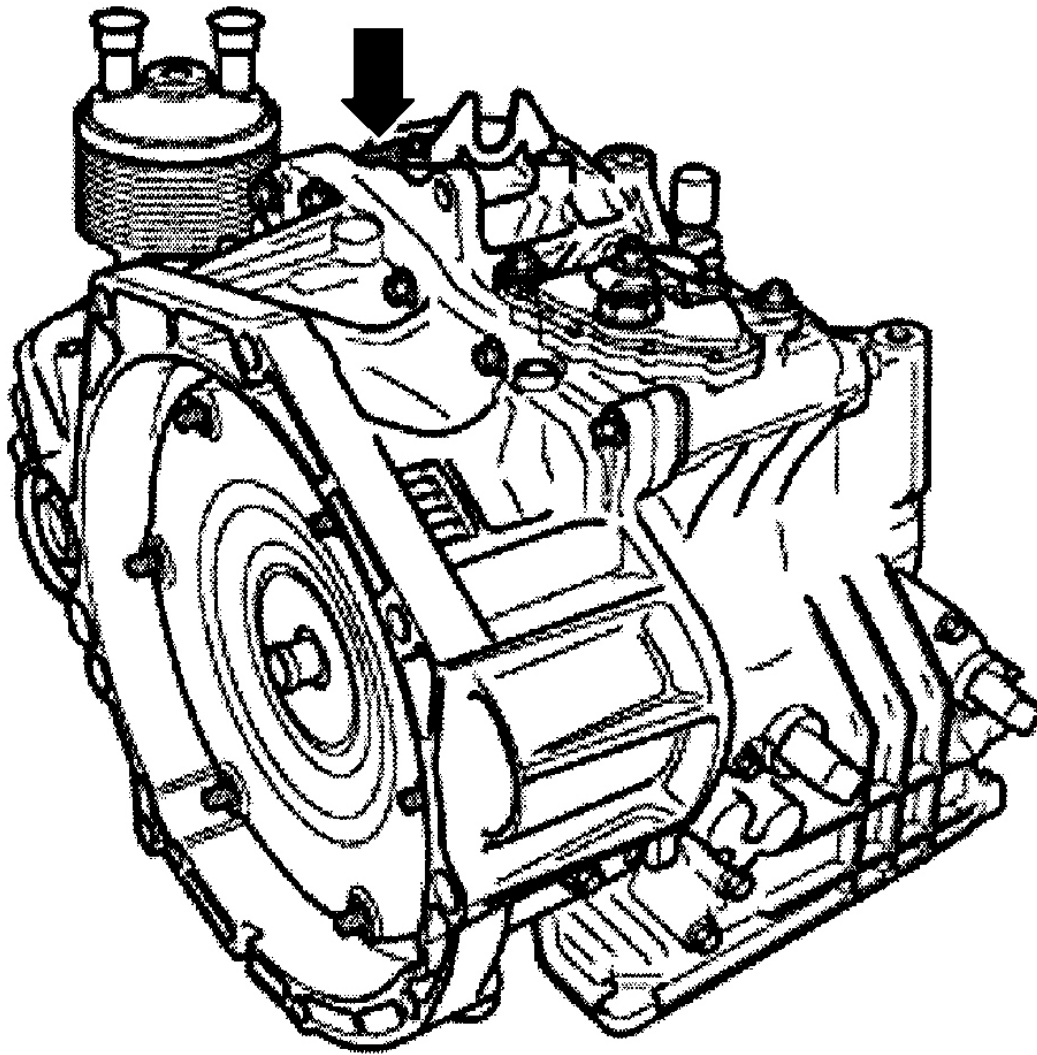
APPLICATION

TRANSMISSION APPLICATION

Application	Transmission Model
1.8L (2002-2004)	09G, 6-Speed
2.0L (2003-2004)	09G, 6-Speed

IDENTIFICATION

Transmission code letters are given on type plate (arrow). See **Fig. 1** . Transmission code letters are also given on vehicle data plate.



G00380844

Fig. 1: Locating Transmission Identification Code
Courtesy of VOLKSWAGEN UNITED STATES, INC.

CODE LETTERS, TRANSMISSION APPLICATION, RATIOS, EQUIPMENT

Automatic transmission			09G					
Transmission	Code letters		GGZ		GHE			
	Manufactured	from to	09.02		05.03			
Torque converter	Code letters		QEAA		QEAA			
Number of plates			Inner	Outer	Inner	Outer	Inner	Outer
	Clutch -K1-		5	5	6	6		
	Clutch -K2-		3	3	3	3		
	Clutch -K3-		3	3	3	3		
	Brake -B1-		4	3	4	3		
	Brake -B2-		6	6	6	6		
Application	Model		New Beetle 1998		New Beetle 1998			
	Engine		2.0 l - 85 kW		1.8 l - 110 kW			

G00390013

Fig. 2: Transmission Codes GGZ & GHE (1 Of 2)
Courtesy of VOLKSWAGEN UNITED STATES, INC.

Transmission	Code letters		GGZ	GHE	
Ratios	1st gear		4.044	4.044	
	2nd gear		2.371	2.371	
	3rd gear		1.556	1.556	
	4th gear		1.159	1.159	
	5th gear		0.852	0.852	
	6th gear		0.672	0.672	
	Reverse gear		3.193	3.193	
Intermediate drive	No. of teeth	Input gear	49	49	
		Output gear	52	52	
	Ratio		1.061	1.061	
Final drive	No. of teeth	Drive pinion	15	15	
		Ring gear	61	58	

G00390014

Fig. 3: Transmission Codes GGZ & GHE (2 Of 2)
 Courtesy of VOLKSWAGEN UNITED STATES, INC.

DESCRIPTION & OPERATION

TRANSMISSION

The 6-speed automatic transmission 09G is equipped with 6 hydraulically activated forward gears. The 2nd, 3rd, 4th, 5th and 6th gears become mechanically driven gears by cutting out torque converter slip when the lock-up clutch is closed.

TORQUE CONVERTER

The torque converter is equipped with a lock-up clutch. The lock-up clutch is closed dependent on load and speed. The 2nd, 3rd, 4th, 5th and 6th gears are then driven mechanically independent of slip.

ATF

The ATF oil is filled-for-life. The ATF does not require changing within the framework of a service.

When checking oil level use only ATF with the Part No. G 055 025 A2.

The ATF level in the planetary gearbox and the final drive is checked and filled simultaneously. See **SERVICING - A/T (09G)** article.

GUIDED FAULT FINDING, VEHICLE SELF-DIAGNOSIS AND MEASURING TECHNOLOGY

Before performing repairs to the automatic transmission, determine the cause of the malfunction as precisely as possible with the aid of "Guided fault finding".

The guided fault finding is performed with Vehicle Diagnosis, Testing and Information System VAS 5051.

TRANSMISSION CONTROL MODULE -J217-

NOTE: **Determining the driving situation and driving resistance dependent gear change point occurs automatically.**

With Driving Situation Gear Changes (Fuzzy Logic)

Advantages:

- Gear changes are consumption orientated
- Maximum engine output is always available
- Individual adaptation of gear change points in all driving situations
- Gear change points are infinitely variable

Gear Change Point Variations For Hills

An additional gear change map automatically selects gear changes for hills dependent upon accelerator pedal position and driving speed.

- Gear change map for extreme uphill stretches is matched to engine output

- Gear change map for extreme downhill stretches is matched to braking effect of the engine

LUBRICATION & ADJUSTMENTS

For lubrication and adjustments, see **SERVICING - A/T (09G)** article in TRANSMISSION SERVICING.

ON-VEHICLE SERVICE

AXLE SHAFTS

For information on axle shaft, see **AXLE SHAFTS** article in DRIVELINE/AXLES.

TRANSMISSION COMPONENTS

For information on components serviceable while transmission is installed in vehicle, see **SERVICING - A/T (09G)** article.

APPLY & BRAKE CLUTCH APPLICATION

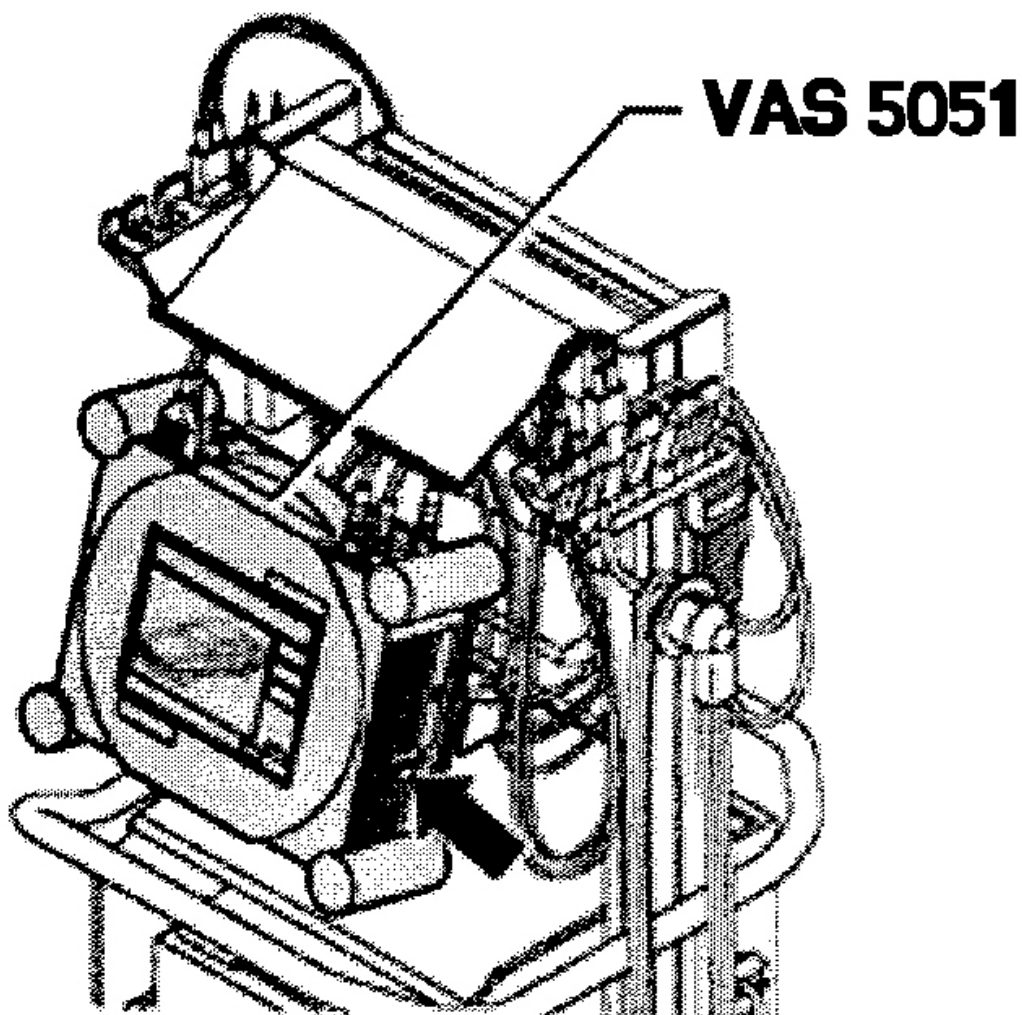
Manufacturer does not provide specific information for apply and brake clutch application.

TRANSMISSION CHECKING

VAS 5051, CONNECTING AND SELECTING FUNCTION

Special Tools And Equipment

- VAS 5051 Vehicle Diagnosis, Testing and Information System
- Diagnostic cable VAS 5051/1 or VAS 5051/3



G00380861

Fig. 4: Identifying Tester (VAS 5051)

Courtesy of VOLKSWAGEN UNITED STATES, INC.

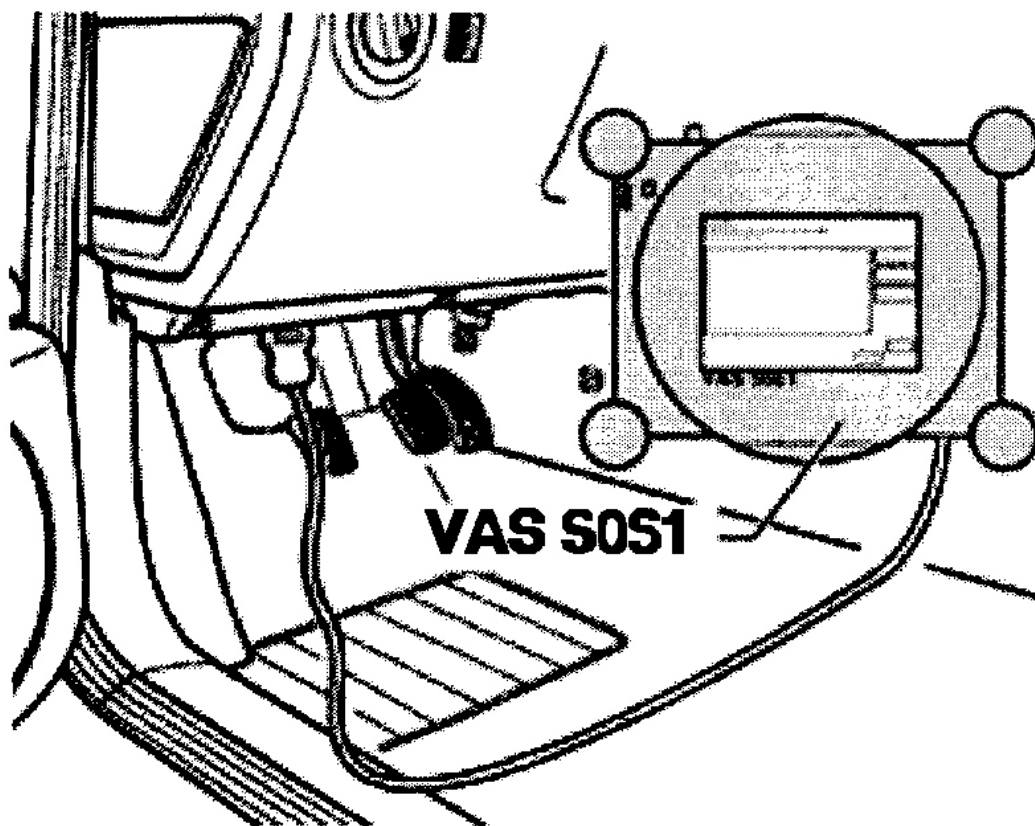
VAS 5051, Connecting And Selecting Function

WARNING:

- When performing a road test the test and measuring units must be secured on the rear seat.
- During the road test only one person must operate these units.

With ignition switched off, connect tester VAS 5051 to Data Link Connector (DLC) using diagnostic cable _____

VAS 5051/1 or VAS 5051/3. See **Fig. 5** .



G00380860

Fig. 5: Connecting Diagnostic Cable To DLC
Courtesy of VOLKSWAGEN UNITED STATES, INC.

Switch tester on (arrow). See **Fig. 4** .

Tester is operationally ready when picture of a vehicle appears on display.

Switch ignition on.

Touch key on screen for: Guided Fault finding.

Select one after another:

- Brand
- Model

- Model year
- Variant
- Engine code

Confirm data as entered:

NOTE: **Wait until the tester has read all the available control modules.**

Using "Go to" key, select "Function/component selection"

Follow instructions on screen to start functions desired.

REPAIR INSTRUCTIONS

The maximum possible care and cleanliness and proper tools are essential to ensure satisfactory and successful transmission repairs. The usual basic safety precautions also apply when performing vehicle repairs.

A number of generally applicable instructions for individual repair operations, which are otherwise mentioned at various points in the repair manual; are summarized here.

BATTERY DISCONNECTING & RECONNECTING

CAUTION: Before beginning repairs on the electrical system:

- **Obtain anti-theft radio security code.**
- **Switch off all electrical consumers.**
- **Switch ignition off and remove ignition key.**
- **Do not loosen or remove ground strap from body. Disconnect terminal from battery only.**

For work steps required after reconnecting battery, see **Fig. 6** .

Work steps	completed?
Diagnostic Trouble Code (DTC) Memory: Check using VAS 5051 Tester in mode "Guided Fault Finding".	
Power windows (where applicable): Completely open and close all power windows.	
Radio: Input anti-theft radio code and check radio, CD & tape player functions as applicable.	
Clock: Check and reset to local time.	
All electrical consumers: Check function.	

G00387816

Fig. 6: Reconnecting Battery Work Steps
 Courtesy of VOLKSWAGEN UNITED STATES, INC.

NOTE: If desired, print this page and use the table above as a checklist.

TRANSMISSION

- When an automatic transmission is replaced the following fluid levels must be checked:

ATF in planetary gearbox and final drive. See **SERVICING - A/T (09G)** article.

Capacities and specifications. See **SERVICING - A/T (09G)** article.

- Do not run engine or tow vehicle with oil pan removed or when there is no ATF in transmission.
- Secure torque converter against falling out when transmission is removed.
- Clean joints and connecting points thoroughly before loosening.
- When installing the transmission ensure that the dowel sleeves between the engine and the transmission are seated correctly.
- Place parts that have been removed on a clean surface and cover so that they are not soiled. Use foil and paper. Do not use fluffy cloths!
- Only install clean components: Only unpack replacement parts immediately prior to installation.
- Carefully cover opened components or seal if the repair cannot be performed immediately.
- Replace transmission if any of the selector elements are scorched/burned.
- A basic (default) setting must be performed each time the transmission is reinstalled.

GASKETS, SEALS

- Always replace O-rings, seals and gaskets.
- After removing seals/gaskets etc. always check contact surfaces on housings or shafts for burrs and damage and correct before reinstalling.
- The open side of an oil seal faces toward the oil.
- Before installing an oil seal moisten the outer surfaces and the sealing lip sparingly with ATF.
- Moisten O-rings with ATF to prevent damage to the O-ring when installing.
- Only use ATF in the areas normally lubricated by ATF. Other lubricants will cause the hydraulic elements to malfunction.
- After installing, check ATF level in planetary gearbox/final drive and correct levels as necessary.

ATF in planetary gearbox and final drive. See **SERVICING - A/T (09G)** article.

Capacities and specifications. See **SERVICING - A/T (09G)** article.

BOLTS, NUTS

- Loosen and tighten the screws and bolts for securing the covers and housings in a diagonal sequence.
- Do not cant particularly sensitive parts, e.g. valve body, and loosen and tighten in stages using diagonal sequence.
- Prescribed torque specifications apply to unoled nuts, screws/bolts.

- Threads of bolts/screws that are secured by locking fluid are to be cleaned with a wire brush. Then insert bolts/screws with AMV 185 100 A1.
- All threaded holes where locking fluid is employed must be cleaned with a thread tap to remove remnants of locking fluid. Otherwise there is a danger that a bolt/screw will shear when reinstalling.
- Replace self locking nuts and bolts/screws.

VALVE BODY

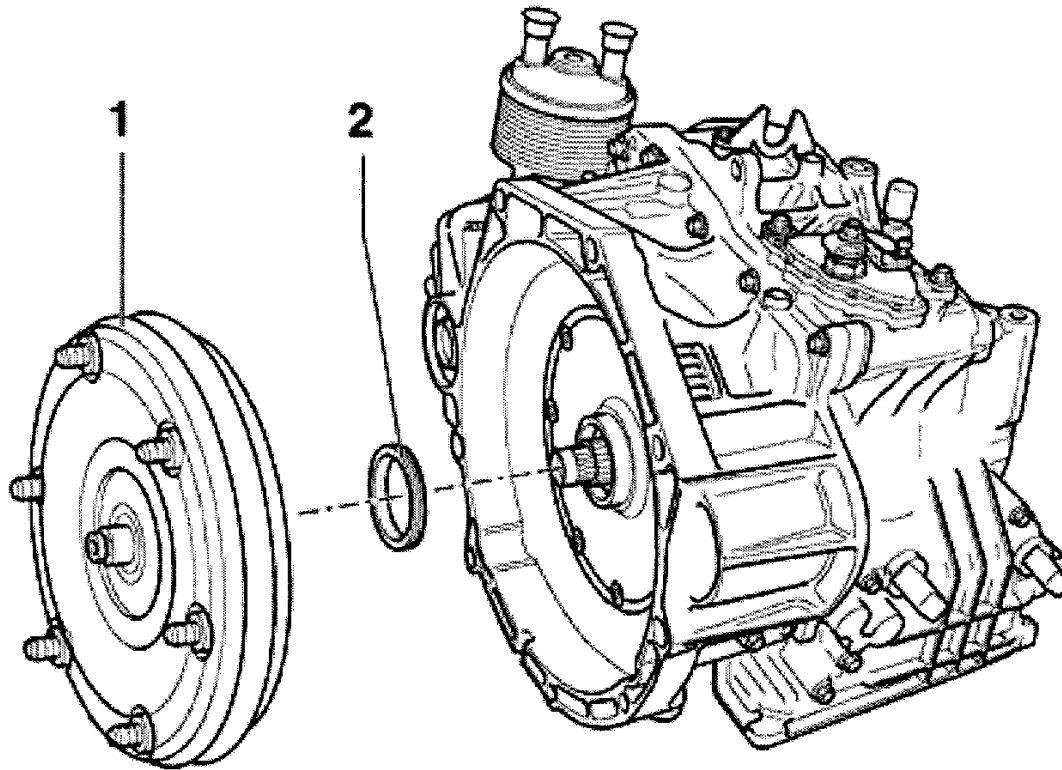
- The valve body is allocated according to transmission code. See **CODE LETTERS, TRANSMISSION APPLICATION, RATIOS, EQUIPMENT** .

GUIDED FAULT FINDING, VEHICLE SELF-DIAGNOSIS AND MEASURING TECHNOLOGY

Before servicing the automatic transmission, determine the cause of the malfunction as precisely as possible with Vehicle Diagnosis, Test and Information System VAS 5051 with the aid of "Guided fault finding", "Vehicle self-diagnosis" and "Measuring technology".

TORQUE CONVERTER

ASSEMBLY OVERVIEW



1 - Torque converter

- ◆ Secure torque converter against falling out when transmission is removed

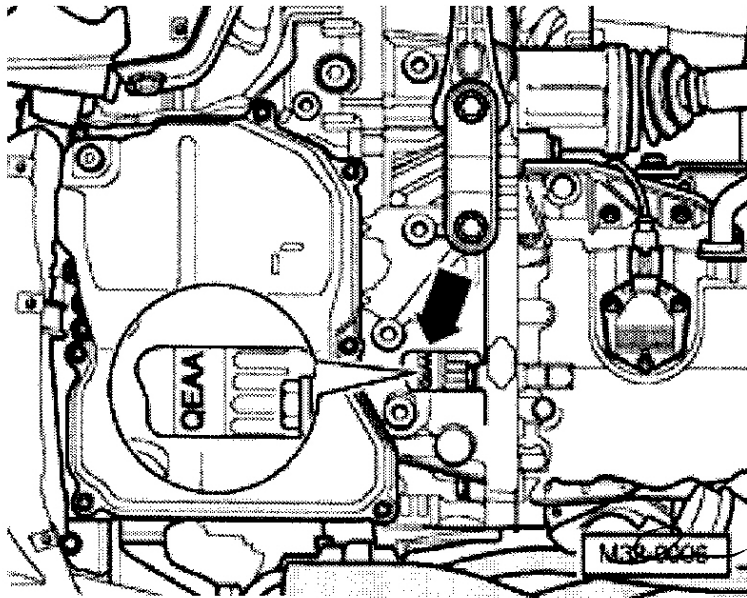
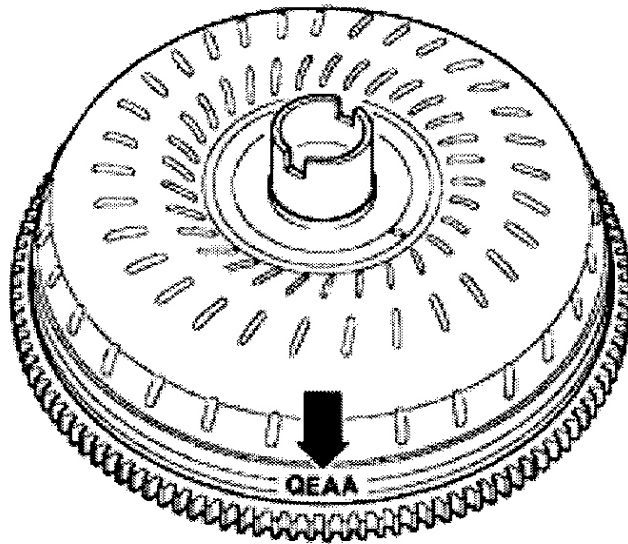
2 - Oil seal

G00390015

Fig. 7: Overview Of Torque Converter Assembly
Courtesy of VOLKSWAGEN UNITED STATES, INC.

TORQUE CONVERTER, IDENTIFICATION

There are various torque converters. Identification is via code letters (arrows). See **Fig. 8** .



* (Transmission installed)

G00390016

Fig. 8: Locating Torque Converter Code
Courtesy of VOLKSWAGEN UNITED STATES, INC.

Allocating torque converter to transmission, see **CODE LETTERS, TRANSMISSION APPLICATION,**

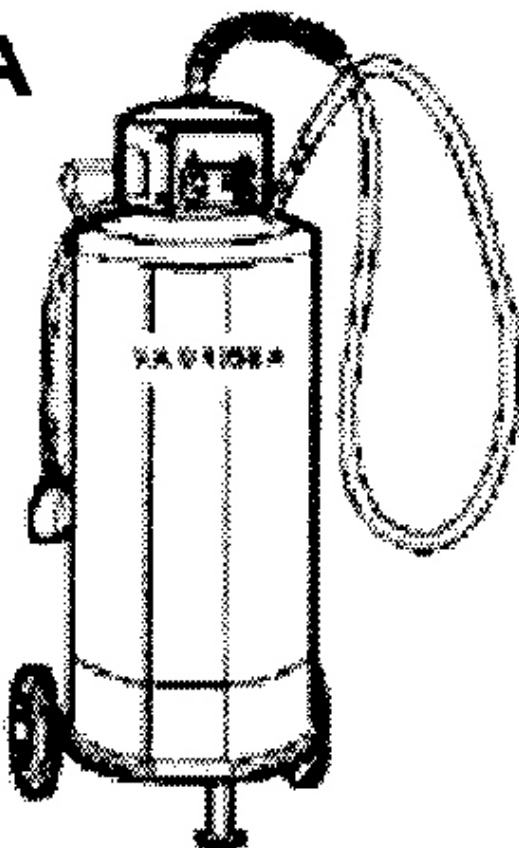
RATIOS, EQUIPMENT .

TORQUE CONVERTER, DRAINING

Special Tools And Equipment

- V.A.G 1358/A Oil extractor unit
- V.A.G 1358 A/1 Oil extraction probe

V.A.G 1358 A



G00387907

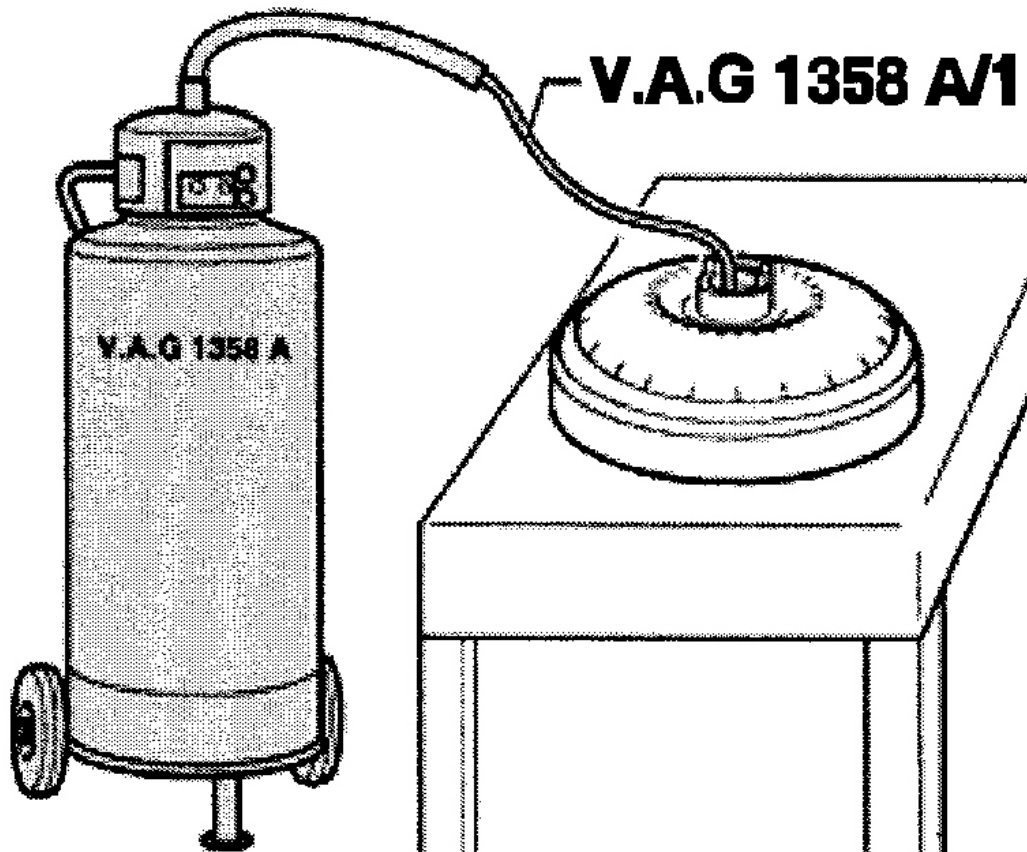
Fig. 9: Identifying Oil Extractor

Courtesy of VOLKSWAGEN UNITED STATES, INC.

Drain the torque converter when performing a major overhaul of the transmission or if the ATF has become

contaminated by abrasion as follows:

Extract ATF from torque converter using V.A.G 1358 A and probe V.A.G 1358 A/1. See **Fig. 10** .



G00390017

Fig. 10: Draining Torque Converter

Courtesy of VOLKSWAGEN UNITED STATES, INC.

TORQUE CONVERTER, REMOVING

Special Tools And Equipment

- VW 681 Extractor lever

VW 681

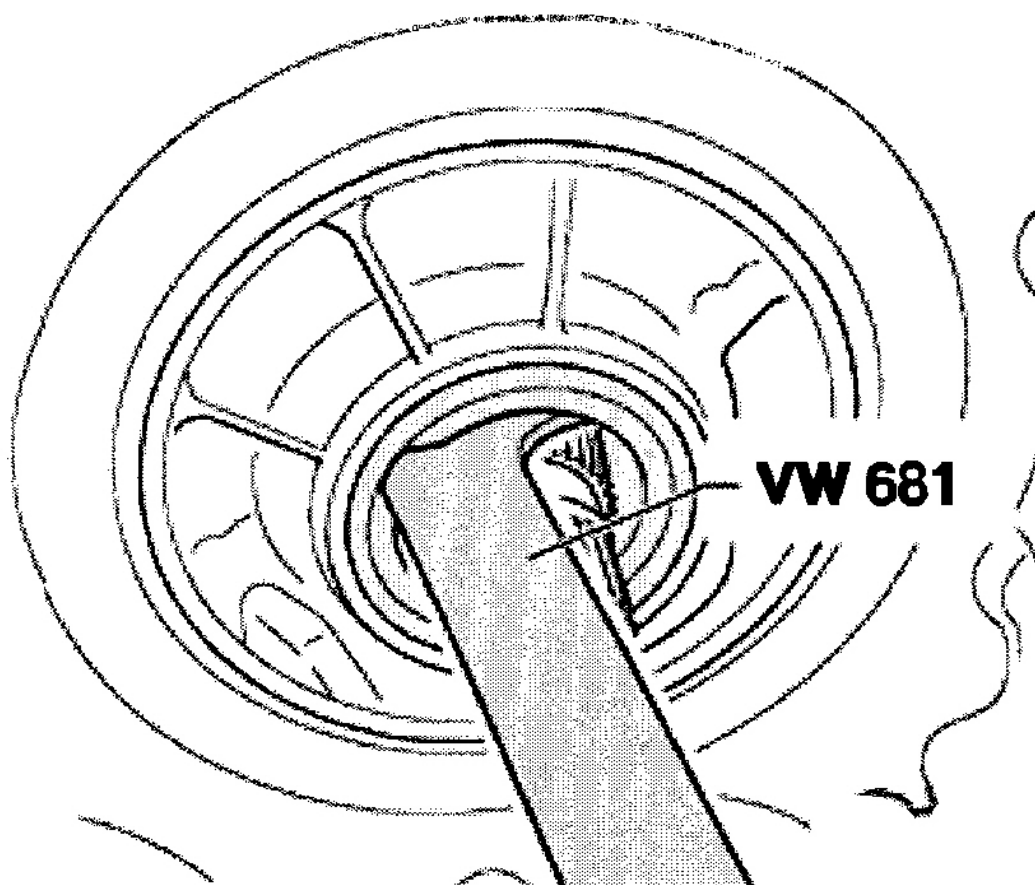


G00387903

Fig. 11: Identifying Extractor Lever

Courtesy of VOLKSWAGEN UNITED STATES, INC.

Removing Torque Converter Oil Seal

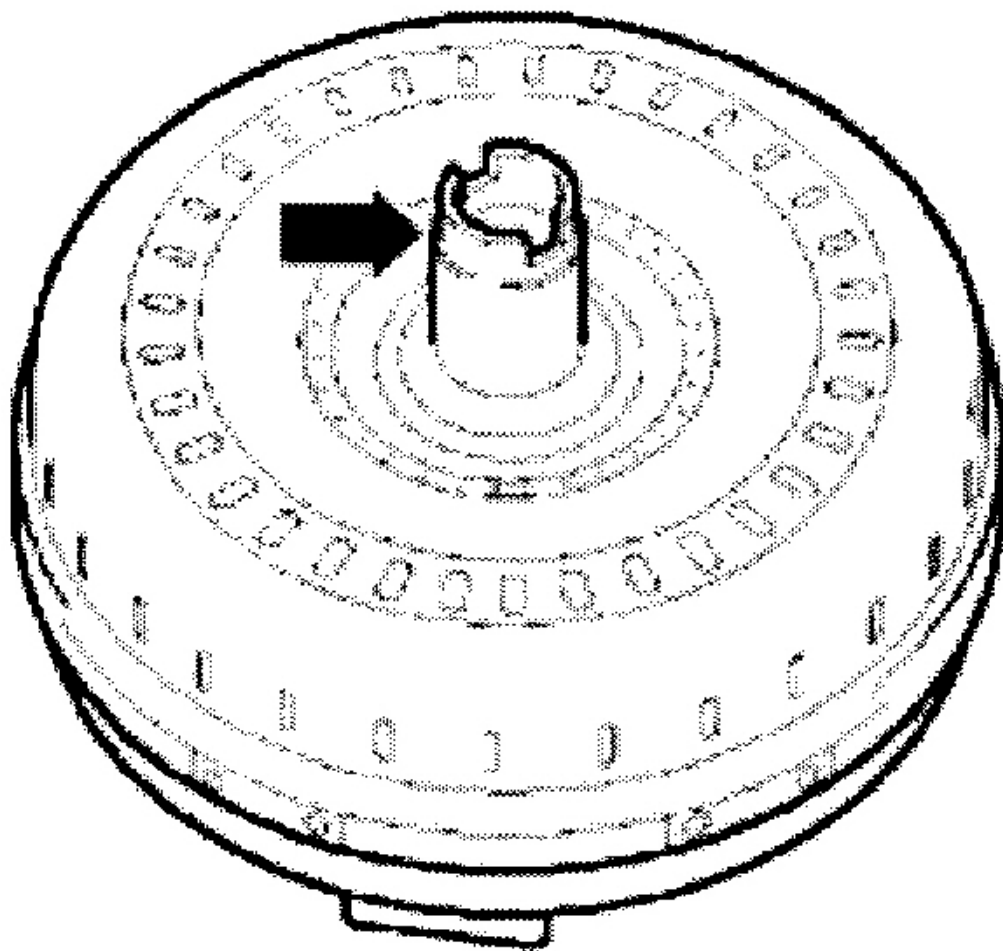


G00390018

Fig. 12: Removing Torque Converter Oil Seal
Courtesy of VOLKSWAGEN UNITED STATES, INC.

TORQUE CONVERTER, CHECKING

Check torque converter hub for scoring (arrow). See **Fig. 13** .



G00390019

Fig. 13: Locating Torque Converter Hub
Courtesy of VOLKSWAGEN UNITED STATES, INC.

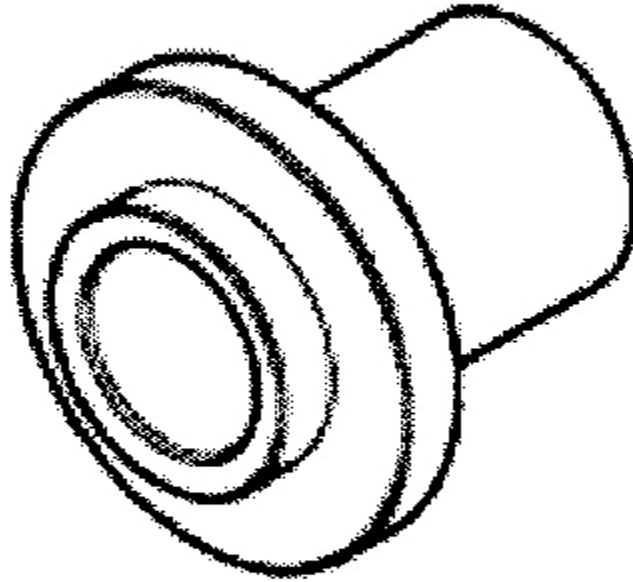
Torque converter is worn and must be replaced if damaged.

TORQUE CONVERTER, INSTALLING

Special Tools And Equipment

- T10175 press piece
- Depth gauge

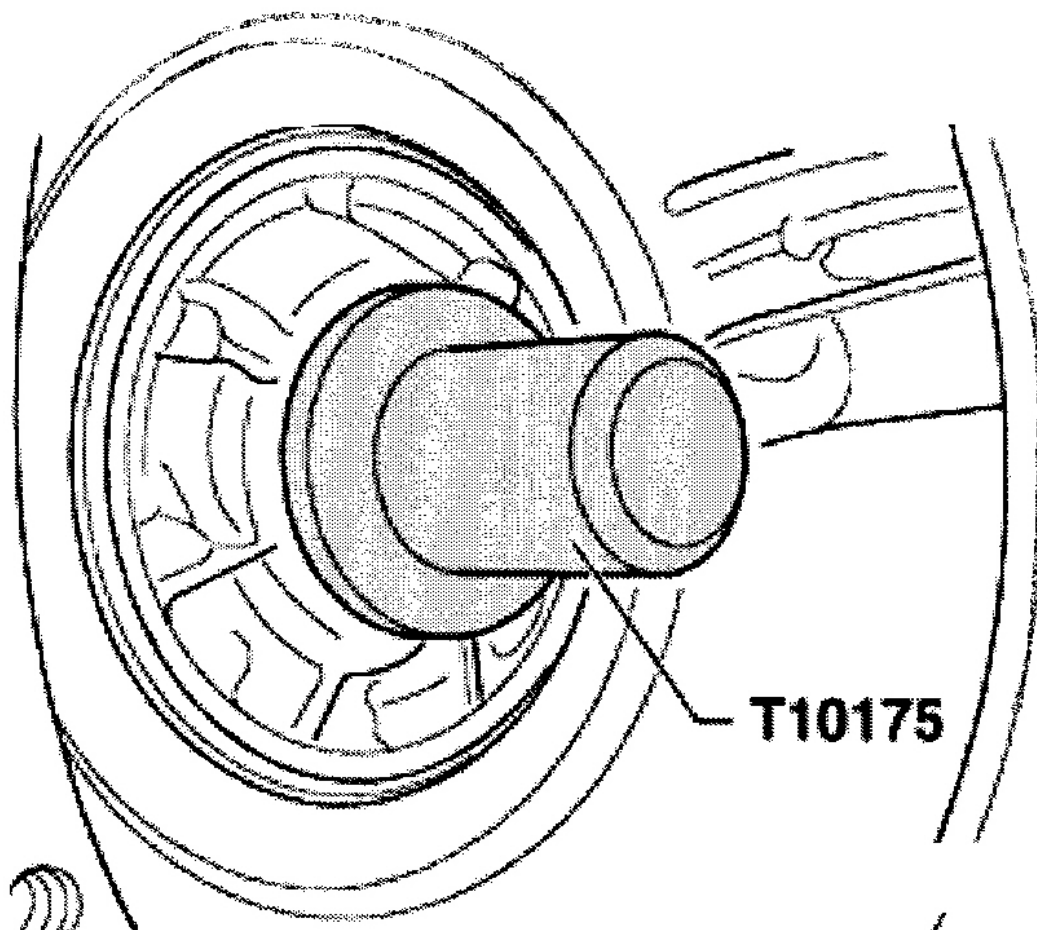
T10175



G00390020

Fig. 14: Identifying Press Piece (T10175)
Courtesy of VOLKSWAGEN UNITED STATES, INC.

Driving In Torque Converter Oil Seal



G00390021

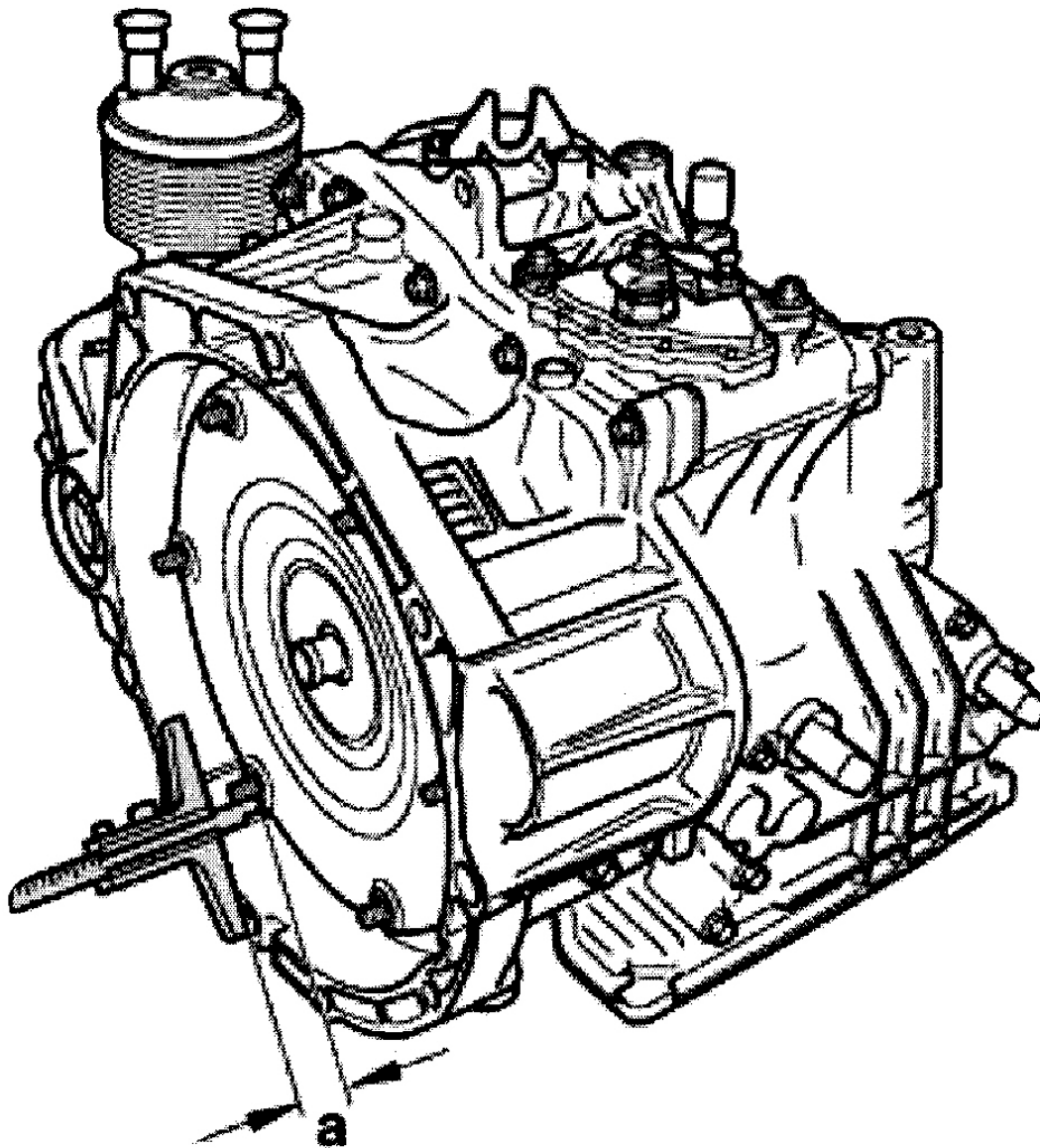
Fig. 15: Driving In Torque Converter Oil Seal Until Flush
Courtesy of VOLKSWAGEN UNITED STATES, INC.

Slide torque converter hub through oil seal and onto first limit stop.

Turn torque converter while pushing in lightly until recesses in torque converter engage into drive of pump and torque converter slips noticeably inward.

Check Installation Dimension Of Torque Converter

When the torque converter is correctly installed in the transmission, the distance -a- between the contact surfaces down by the studs on the torque converter and the contact surfaces of the torque converter housing is approx. 20 mm. See **Fig. 16** .



G00390022

Fig. 16: Checking Installation Dimension Of Torque Converter
Courtesy of VOLKSWAGEN UNITED STATES, INC.

If the torque converter is incorrectly installed this distance is considerably less.

CAUTION: When the torque converter is incorrectly installed the torque converter

drive or the ATF pump will be destroyed when the transmission is connected to the engine.

When subsequently installing the transmission the following points must be observed:

When tightening the bolts on the engine/transmission flange, check often that the torque converter still moves behind the drive plate.

If the torque converter does not turn, one must assume that it has not been installed correctly and the torque converter drive or the ATF pump will be destroyed when finally tightening the bolts.

OVERHAUL

Manufacturer does not provide overhaul procedures or specifications. For fluid capacities and types, adjustment or servicing procedures, see **SERVICING - A/T (09G)** article. For removal and installation procedures, see **REMOVAL & INSTALLATION - A/T (09G)** article.